University of Alberta

Normative Feedback and Student Drinking:

Controlled Study of an Online Intervention

by

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Abstract

Personalized normative feedback (NF) interventions have emerged as theoretically-driven and effective interventions for reducing heavy drinking. *Study 1* compared a behaviourally-focused online NF intervention with an attitudinally-focused online NF intervention and a no-treatment control group using an experimental design. *Study 2* used qualitative methods to understand reactions to NF. At post-intervention, results of *Study 1* showed that neither NF treatment was successful in significantly reducing alcohol use in comparison with the control group. However, sex by experimental condition interactions suggested that men in the NF conditions reduced their follow-up drinking to a greater extent than women. Results of *Study 2* indicated that participants found the NF information they received to be credible, but ineffective in motivating change in drinking. While students may react positively to NF, its use in promoting lasting change in drinking practices may be limited. Sex is an important factor to consider when designing personalized NF interventions.

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CHAPTER ONE

Introduction

It has been more than five decades since Strauss and Bacon (1953) published *Drinking in College*, a text discussing excessive alcohol use and experience of alcohol-related problems among undergraduate students attending college in the United States [US]. While student drinking has since emerged as one of the most widely studied phenomena in substance use research (Dowdall & Wechsler, 2002), today alcohol remains "the most pervasively misused substance on college campuses" (Perkins, 2002b, p. 91). Heavy episodic drinking, the consumption of five or more drinks in a row for men or four or more drinks in a row for women (Wechsler, Dowdall, Davenport, & Rimm, 1995), is more prevalent among US post-secondary students than it is among same-age peers in the general population not attending college or university (O'Malley & Johnston, 2002). In the US, rates of heavy episodic 'binge' drinking on 119 college campuses have remained virtually unchanged since 1993 (Wechsler, Lee, Kuo, & Lee, 2000). In Canada, comparable longitudinal data are not available. However, research conducted among various post-secondary populations across the country (e.g., student athletes [Spence & Gauvin, 1996], college students [Mathieson, Faris, Stam, & Egger, 1992], Ontario post-secondary students [Gliksman, Newton-Taylor, Adlaf, DeWit, & Giesbrecht, 1994]) has yielded trends remarkably similar to those documented in the US. Recently published, the first cross-national research report on post-secondary student drinking indicated that the prevalence of heavy episodic drinking on Canadian campuses may be somewhat lower than in the US, but that students in Canada generally report higher rates of lifetime and past-year alcohol use (Kuo et al., 2002).

Heavy episodic drinking is associated with a spectrum of acute and long-term health, behavioural, and social problems (Perkins, 2002b; Wood, Sher, Erickson, & DeBord, 1997). Students who engage in heavy episodic drinking are up to ten times more likely than non-drinkers to drive while impaired, risk academic failure, suffer alcohol-related injury, and engage in unsafe sexual activity (Wechsler, Davenport, Dowdall, Moeykens, & Castillo, 1994). The effects of heavy alcohol consumption also extend beyond the level of the individual. Many students report being negatively impacted by the drinking habits of their peers through sleep and study disruption, vandalism, and physical, verbal, and/or sexual violence (Wechsler, Moeykens, Davenport, Castillo, & Hansen, 1995). Factors in the broader social environment may also be affected, including relationship strain (e.g., family disruption), institutional disturbance (e.g., property damage), and community disruption (e.g., noise; Perkins, 2002b).

Unchanging rates of heavy episodic drinking, coupled with a growing awareness for alcohol-related harms, are now prompting health promotion scholars to question the effectiveness of existing campus campaigns aimed at lowering excessive alcohol use. To date, most university-based alcohol interventions in North America have attempted to lower rates of heavy episodic drinking on the basis of knowledge and/or attitudinal modification. This approach has long endured criticism for its reliance on traditional models of health education and health promotion, whereby the interaction of cognition, affect, and behaviour is assumed to influence behaviour change processes and outcomes (Walters, Bennett, & Miller, 2000). However, recent reviews of the literature by Walters and Bennett (2000) and Larimer and Cronce (2002) suggest that *normative feedback*

interventions, an emerging knowledge/attitudinal health promotion strategy, can yield promising results.

Normative feedback [NF] interventions assume that personal drinking behaviour is determined in part by passive social influences (i.e., individual expectations about 'normal' approval for and use of alcohol among members of social reference groups; Oostveen et al., 1996). NF campaigns are aimed at correcting students' widely-held misperceptions about normative alcohol use, given that many students falsely believe that: (i) their peers' attitudes towards drinking are more permissive than in actuality (Perkins & Berkowitz, 1986; Perkins &Wechsler, 1996; Prentice & Miller, 1993), and (ii) their peers consume alcohol in higher quantity and with greater frequency than is accurate (Baer, Stacy, & Larimer, 1991; Page, Scanlan, & Gilbert, 1999; Perkins & Wechsler, 1996). NF interventions provide students with comparative data documenting the extent to which personal perceptions of peer attitudes and/or behaviours differ from actual trends, on the basis that falsely perceiving widespread liberal attitudes and prevalent high-risk drinking may support, or even condone, excessive alcohol consumption.

To date, NF interventions have employed a variety of health communication strategies with varying degrees of success. Mass media campaigns conducted by Haines and Spear (1996) and Gomberg, Schneider, & DeJong (2001) significantly increased proportions of students correctly perceiving campus norms for binge drinking, and effectively lowered self-reported alcohol use. However, these campaigns involved a variety of communication strategies (e.g., newspaper advertisements, radio advertisements, public education displays, flyer and poster distribution, student contests,

presentations by campus mascots), making them both costly to operate and challenging to organize. Less extensive discussion-based programs, targeted specifically at populations considered high-risk for experiencing alcohol-related problems (e.g., students living in campus residence, fraternity and sorority members) achieved only moderate success (Barnett, Far, Mauss, & Miller, 1996; Peeler, Far, Miller, & Brigham., 2000; Steffian, 1999), and prompted scholars to question the dynamics of group interventions. For example, Walters, Bennett, and Noto (2000) speculated that the assembly of heavy drinkers for educational sessions might inadvertently reinforce the perceived normalcy of high-risk alcohol use, thereby "detracting from the effectiveness of the feedback" (p. 224). In contrast, NF interventions that have experienced the greatest degree of success are those administering individualized NF to heavy drinkers.

Individualized feedback has long been a component of the Alcohol Skills Training Program [ASTP], a widely used motivational interview approach used to encourage behaviour change in problem drinkers (Fromme, Marlatt, Baer, & Kivlahan, 1994). It is also included as part of the Brief Alcohol Screening and Intervention for College Students [BASICS], a version of the ASTP modified for college student audiences (Dimeff, Baer, Kivlahan, & Marlatt, 1999). However, a recent study by Neighbors and Lewis (2003) suggests that administering NF alone may be as effective as completing ASTP in its entirety. Individualized feedback delivered by hand or through the mail has also shown promise in reducing heavy alcohol use among students (i.e., Agostinelli, Brown, & Miller, 1995; Collins, Carey, & Sliwinski, 2002; Walters, 2000; Walters, Bennett, & Miller, 2000). Individualized NF interventions are now considered

by many professionals to be cost-efficient, effective, and simple to operationalize (Larimer & Cronce, 2002; Walters, 2000).

A normative feedback intervention targeted at the individual level has not yet been tested among undergraduate students attending university in Canada. Therefore, the present research aimed to extend findings in this area using NF messages derived from the results of the *1998 Canadian Campus Survey* (Gliksman, Adlaf, Demers, Newton-Taylor, & Schmidt, 2000) and distributed electronically to a sample of undergraduate students attending the University of Alberta. A two-part randomized control trial [RCT], involving both quantitative and qualitative research methods, was conducted to respond to two key gaps in the NF literature. The primary goal of *Study 1* was to systematically test the role of specific NF message types in determining follow-up drinking behaviour. The primary goal of *Study 2* was to qualitatively explore the ways in which students respond to receipt of NF. At the time of research, both areas were considered relevant to the advancement of knowledge in social norms interventions.

With respect to the first study focus, ambiguous definitions and a failure to distinguish between normative message types (i.e., attitudinal or behavioural) are considered major limitations in the design of existing NF studies (Borsari & Carey, 2001; Trockel, Williams, & Reis, 2003). Further, the extent to which attitudinal NF messages may have a health promoting effect on follow-up levels of alcohol consumption has not been clearly demonstrated (Borsari & Carey, 2003). With respect to the second study focus, scholars have recently noted a shortage of data related to the believability, perceived credibility, and appeal of NF for students, and have called for additional research in this area (e.g. Barnett et al., 1996; Berkowitz, 2004; Granfield, 2002; Neal &

Carey, 2004; Steffian, 1999; Wechsler et al., 2003; Werch et al., 2000). Given that existing research has been limited almost exclusively to the positivist tradition, very little is known about student responsiveness to NF, and studies documenting the ways in which students themselves view peer behaviour have long been neglected in substance abuse prevention literature (Dowdall & Wechsler, 2002; Lederman, Stewart, Goodhart, & Laitman, 2003).

Given that both *Study 1* and *Study 2* involved a sample of Canadian undergraduate students, the present study also allowed for research into the extent to which young adults attending university in Alberta, Canada shared the false perceptions related to 'normal' drinking that American students have been shown to hold (i.e., a view that others are more tolerant of alcohol use; an overestimation of others' drinking quantity/frequency). This was considered an important secondary goal of the research because although previous studies have shown that Canadian students differ from their American counterparts in some ways (e.g., proportion of students that have reached legal drinking age; proportion of students that are affiliated with a Greek fraternity or sorority; Kuo et al., 2002), university communities in this country have historically looked to US research to support the development of campus substance abuse prevention programming.

In addition, because both *Study 1* and *Study 2* involved the use of electronic data collection and intervention, there was an opportunity to examine the efficacy of e-research and health education. This was also considered a valuable secondary goal of the research; electronic dissemination of NF information is intuitively a strong method of reaching student audiences because students have high rates of computer usage and campuses have easy access to the Internet (Couper, 2001; Dillman, 2000; McCabe, Boyd,

Couper, Crawford, & D'Arcy, 2002). While McCabe and colleagues (2002) have shown that online alcohol-related surveys administered to students have distinct advantages over traditional mail-based surveys (e.g., rate of response, timeliness of completion, development of a representative sample), Couper (2001) noted that the extent to which online information is accessed by a population depends on a number of factors. These include: over-sampling of the online population, individuals' interest in the World Wide Web as an information source, individuals' confidentiality concerns with respect to e-mail, and survey appearance (variable due to browser settings, user preferences, and variations in hardware). To date, the extent to which NF interventions are suitable for electronic dissemination been examined in a pilot test conducted by the Centre for Addiction and Mental Health (Cunningham, Humphreys, & Koski-Jannes, 2000), but the extent to which this form of dissemination leads to change in drinking behaviour has not been studied. There is also a notable shortage of data related to the perceived believability of web-administered NF.

This two-part NF intervention study will be presented in four subsequent chapters. Chapter two presents a review of the literature, in which key themes in social norm theory and practice are identified, personalized NF intervention studies focused university populations are systematically reviewed, the rationale for conducting the study is strengthened, and key research questions are articulated. Chapter three outlines the research methods for *Study 1* and *Study 2*, and describes the data collection instruments. Chapter four discusses both quantitative and qualitative data analysis procedures, and presents the results of the research. Finally, chapter five discusses the key findings

referred to in the preceding chapter. It also outlines the implications of the study, as well as its limitations and conclusions.

CHAPTER TWO

Literature Review

Misperceived Campus Norms

Substance abuse prevention literature published over the last decade has given considerable attention to the question of prevailing campus norms for student drinking, often distinguishing between two types of norms: (i) attitudinal, and (ii) behavioural. The former, referred to by Borsari and Carey (2003) as the "norm of 'ought'" (p. 331) refer to perceived moral rules for acceptable and unacceptable alcohol use. The latter, called the "norm of 'is'" (p. 331), refer to perceived typical drinking quantity and/or frequency. Both normative types may represent different domains of social influence, and may contribute to an environment that encourages drinking (Trockel et al., 2003).

In a landmark study, Perkins and Berkowitz (1986) determined that the majority (62.7%) of undergraduate students in a large US college sample consistently and grossly overestimated the extent to which drinking to intoxication was considered acceptable among peers. The actual campus norm (i.e., being 'drunk' is acceptable only in limited circumstances) was correctly perceived by only one-third (35.4%) of those surveyed. Similar attitudinal findings have since been documented among US student populations in three other studies. First, Prentice and Miller (1993) examined perceived levels of comfort with university drinking among two reference groups: 'the average student' and 'friends.' Results of the study demonstrated statistically significant differences between self-reported and perceived levels of comfort for both comparison groups. Second, the first US national study of college drinking (Perkins & Wechsler, 1996) focused on the assessment of attitudinal norms using an index of perceived campus culture. It revealed

considerable variation in perception of the normative climate, both within and across campuses. Third, Bourgeois and Bowen (2001) conducted a study of alcohol-related attitudes and beliefs in a sample of US students living in residence. They found that students consistently rated 'typical dorm residents' and 'friends' as being more in favour of alcohol than they were personally, and perceived others to be more lenient with regard to acceptable levels of alcohol consumption before driving.

Misperceived behavioural norms are similarly well documented in the literature. An early study of 280 undergraduates found that the strong majority (77%) assumed that members of their living groups (e.g., residence, fraternity, sorority) drank more than they did. The perceived level of 'typical' drinking within these groups was also found to far exceed actual levels, a trend persistent across both sex and housing types (Baer et al.,1991). Similar findings were documented by Agostinelli and Miller (1994), whose sample of students, faculty, and staff overestimated actual rates of both heavy student drinking and driving while impaired. Page et al. (1999) also found that the prevalence of heavy episodic 'binge' drinking, defined as the consumption of five or more alcoholic drinks on one occasion for students of either sex, was overestimated by both males and females alike, for both same and opposite sex. Sher, Bartholow, and Nanda (2001) revealed similar patterns in a longitudinal study of drinking patterns within the Greek system. The authors concluded that perceptions of heavy drinking norms were largely responsible for the prevalence of heavy drinking among fraternity and sorority members participating in the study. Finally, the second US national study of normative college drinking focused not on attitudinal, but on behavioural norms (Perkins, Meilman, Leichliter, Cashin, & Presley, 1999). Assessing perceived use of alcohol for the 'average

student on your campus,' results of the survey suggested not only that exaggerated norms continued to be commonplace among postsecondary populations, but that it was rare for students to acknowledge that their own quantity/frequency of alcohol consumption exceeded the perceived campus norm.

Borsari & Carey (2003) completed the first meta-analytic review of perceived self-other discrepancies [SODs], defined as differences between: (i) approval of alcohol use and/or personal drinking, and (ii) estimates of approval of alcohol use and/or personal drinking by a reference group. The authors reviewed 102 tests contained within 23 studies conducted between 1986 and 1992, and for each test, coded the direction of the effect of the perceived SOD. Ultimately, 93% of tests revealed positive SODs (i.e., those in which subjects viewed others as drinking in higher quantity/frequency and/or as holding more tolerant views of alcohol than they held themselves). Thus, there is overwhelming evidence to suggest that many students view others as more tolerant of excessive alcohol use, while still others "tend to believe that someone else drinks more than they do" (Borsari & Carey, 2003, p. 332).

Theoretical Accounts

Social and psychological theorists have proposed a number of possible explanations for the development and persistence of false normative perceptions, often distinguishing between explanations operating at cultural, social, and psychological levels (Perkins, 2002a). Culturally-based theories focus on the role of media images (e.g., news reports, television shows, movies) and alcohol-industry advertisements and promotions (e.g., happy hours, partnerships with popular spring break destinations) as mechanisms for transfer of inaccurate perceptions (Agostinelli & Miller, 1994; Glider,

Midyett, Mills-Novoa, Johanssen, & Collins, 2001; Lederman et al., 2003; Perkins, Meilman, Leichliter, Cashin, & Presley, 1999). Such elements of popular entertainment may "disproportionately and unrealistically emphasize heavy drinking as part of youth culture" (Perkins, 2002a, p. 168).

Socially-based theories refer largely to memories of college experiences, often recounted through social conversations, and hypothesized to focus on extreme drinking behaviours that occur only among a fraction of the student population (Baer et al., 1991; Perkins et al., 1999; Thombs, Olds, & Ray-Tomasek, 2001). Social conversations may be based on both direct and indirect observations of alcohol-related experiences (Borsari & Carey, 2003), and the availability of obvious abuses may impact the extent to which communications are distorted (Kahneman & Tversky, 1973 as cited in Suls & Green, 2003). In particular, drinking games have been examined for their role in projecting the image that there are high drinking norms for college students (Nagoshi, Wood, Cote, & Abbit, 1994). These types of images have been shown to affect high school students perceptions of college student drinking prior to their enrollment at a post-secondary institution (Read, Wood, Davidoff, McLacken, & Campbell, 2002).

Finally, psychologically-derived explanations for systematic errors in norm estimation include pluralistic ignorance and psychological attribution. Pluralistic ignorance refers to the belief that one's private attitudes are different from those of others, despite identical public behaviour (Prentice & Miller, 1993; Miller & Prentice, 1994; Schroeder & Prentice, 1998). This theory examines why individuals may act differently from how they feel. For example, Suls and Green (2003) suggested that students exposed to negative consequences of drinking by their peers (e.g., through sick

or 'hung-over' roommates) may develop private misgivings about heavy alcohol use, but refrain from expressing concern because they assume that the attitudes of others correspond more closely to the shared social identity of the group. Results of a study conducted by Prentice and Miller (1993) confirmed this hypothesis; many students, mistakenly believing that their attitudes were discrepant from those of other students, showed signs of alienation from the university and the student body.

Psychological attribution refers to the belief that others' behaviours are more reflective of stable individual traits than situational variables (Perkins, 1994 as cited in Perkins et al., 1999; Perkins, 2002a). Peer drinking practices, a key source of normative information, are susceptible to this error; without contextual information, drunkenness may be attributed to an individual's dispositions or lifestyle choices, instead of being recognized as an occasional behaviour or atypical event (Borsari & Carey, 2003). Ultimately, states Perkins (2002a), drunkenness "becomes perceived as more common or typical of them than is actually the case as the observer's mind continually attempts to account for peer behavior [sic]" (p. 168).

Miller and Prentice (1996) have argued that no single factor can explain the formation or perseverance of misperceptions in student alcohol use. Rather, they suggest that exposure to multiple sources of information (i.e., cultural and social observations and communications) and variations in individual factors (i.e., private beliefs) ultimately combine to produce inaccurate estimations of others' attitudes and/or behaviours.

Behavioural Effects

Once formed, misperceptions related to alcohol use play a significant role in determining individual drinking practices. Scholars propose that light to moderate

drinkers often feel compelled to 'conform to the norm,' adjusting their drinking behaviour to accord with internalized beliefs about alcohol use, however inaccurate (Borsari & Carey, 2001; Glider et al., 2001). Thus, excessive drinking elicits perceived approval from others (Schroeder & Prentice, 1998) and is seen as less socially risky than light drinking or abstention (Borsari & Carey, 2001). It is also hypothesized that heavy drinkers are affected by misperceived norms, such that these individuals tend not to view their abnormal drinking habits as discrepant from the behaviour of others. Theorists refer to this phenomenon as the *false consensus effect* or the process of *social norm calibration*, and suggest that it is ego-protective because it restricts the view that excessive alcohol use may be problematic, risky, or embarrassing (Agostinelli & Miller, 1994; Baer et al., 1991; Ott & Haertlein, 2002; Prentice & Miller, 1993). Research by Wechsler et al., 1994 found that less than 1% of frequent binge drinkers (i.e., those who consumed five or more drinks per sitting three or more times in the two weeks prior to being surveyed) perceived that they had a potential drinking problem.

Positive associations between drinking and inaccurate normative perceptions have been shown to be consistent and significant (e.g., Baer et al., 1991; Clapp & McDonnell, 2000; Kuther & Timoshin, 2003; Page et al., 1999; Perkins & Berkowitz, 1986; Perkins & Wechsler, 1996; Perkins et al., 1999; Prentice & Miller, 1993; Read et al., 2002; Wood, Nagoshi, & Dennis, 1992). There is also some evidence that misperceived norms are associated with alcohol-related problems (Perkins & Wechsler, 1996; Thombs, Wolcott, & Farkash, 1997; Wood et al., 1997). Other studies have shown that norm misperceptions account for the greatest amount of explained variance in self-reported consumption of alcohol, beyond expectations about the effects of alcohol and the

importance of drinking in high school (Reis & Riley, 2000) and beyond the importance of socializing in drinking situations and modeling (Oostveen, Knibbe, & DeVries, 1996). A recent study by Perkins (2002a) also concluded that being surrounded by peers perceived to approve of heavy drinking influenced alcohol consumption more than social background factors such as age, year of study, and number of close friends. Finally, Kuther and Higgens-D'Allessandro (2003) determined that perceived norms for peer alcohol use predicted personal alcohol consumption in a sample of 299 senior high school and undergraduate university students, whereas perceived parental norms did not have this effect.

Clearly, previous research demonstrates that attitudinal and behavioural normative misperceptions can profoundly affect university students' drinking patterns. This finding lends intuitive appeal to the hypothesis that correcting misperceptions through the communication of actual norms (i.e., conservative attitudes toward drunken behaviour and/or moderate drinking patterns) will have a health promoting effect on students who drink heavily. Stemming from this belief, norm education interventions have been implemented with considerable enthusiasm in recent years. Though evaluations of many such programs are not available in the academic literature, published reports suggest that significant reductions in rates of binge drinking have been realized on several campuses (DeJong & Linkenbach, 1999).

Normative Feedback Interventions

The theoretical premise of NF interventions is in line with *cognitive dissonance theory*. This suggests that providing accurate information to those who misperceive the norm (thereby creating cognitive dissonance) may catalyze a process of change

(Berkowitz, 2004). Ultimately, NF interventions are grounded in the notion that if students become aware of the disjunction between perception and reality, the norm will "lose its prescriptive force" (Schroeder & Prentice, 1998, p. 2152).

NF programming focuses on the distribution of positive messages (e.g., safe and responsible drinking) intended to promote the healthy attitudes and behaviours of the majority. In this way, NF interventions represent a paradigm shift from previous mass media campaigns that overwhelmingly emphasized negative aspects of drinking and may have contributed to the perception that student alcohol use is worse than in reality (Ott & Haertlein, 2002). NF messages generally employ a non-confrontational tone and rely on indirect methods of persuasion. This strategy is designed to encourage change among NF recipients, without giving the impression that change is being imposed (Glider et al., 2001).

Although the literature does not uniformly support the efficacy of NF interventions (refer to equivocal results presented in Barnett et al., 1996; Gomberg et al., 2001; Peeler et al, 2000; Steffian, 1999; Wechsler et al., 2003), the results of several personalized NF studies indicate that NF information, tailored to the individual and delivered by hand or by mail, has the greatest potential for fostering lasting behaviour change. A systematic search of current literature using academic databases (i.e., CINAHL; ERIC; HealthSTAR; Medline; PsychINFO) and organizational websites (i.e., Alcohol Policy Network, Canadian Centre on Substance Abuse; Health Canada; Social Norms Resource Centre [US]) revealed that 13 separate empirical studies focused on NF interventions have been published since 1995. Of these, six studies were specific to the dissemination of personalized NF information.

Agostinelli et al. (1995) were the first scholars to draw theoretical inspiration from the work of Perkins and Berkowitz (1986), designing a RCT at the University of New Mexico. The authors recruited 23 heavy drinkers from the student body (i.e., those who consumed more than 80 drinks in the month prior to onset of the study) for random assignment into one of two groups: intervention or control. Those in the experimental condition were mailed three pages of information derived from the *Drinker's Check-up* motivational feedback interview (Miller, Sovereign, & Krege, 1988; Miller & Sovereign, 1989), including blood alcohol content [BAC] calculations and estimates of personal risk for developing alcohol problems. Embedded within this information were behavioural normative data (i.e., measures for average weekly personal alcohol consumption in comparison with sex-based US population norms). Six weeks post-intervention, students in both groups completed follow-up assessment interviews to report follow-up drinking patterns. Results of the research indicated that drinks per week and peak BAC decreased significantly over time for students who received feedback, but not for those in the control group. Students who received feedback decreased their level of consumption by a mean of 7.9 drinks per week, while those in the control group decreased their level of consumption by a mean of only 0.5 drinks per week.

In the wake of preliminary successes revealed in the study described above, Nye, Agostinelli, & Smith (1999) presented somewhat less convincing data examining the immediate effects of receiving NF information in a research setting. Results of the study were used to test a self-regulation model for predicting problem recognition among 72 heavy drinkers at the University of New Mexico. Separately by sex, participants were randomly assigned to one of four experimental conditions: (i) normative information [NI]

only, (ii) self-focusing [SFI] information only, (iii) normative and self-focusing information [NI/SFI], and (iv) control. NI included a printed bar graph and explanatory text summarizing heavy drinking patterns among campus students of same sex, while SFI included only a report on personal alcohol use patterns. Upon receipt of feedback, subjects completed two measures of problem recognition and participated in a thinking-out-loud task (Ericsson & Simon, 1993) designed to collect verbal reactions indicative of problem recognition and defensive processing. Data analyses for the problem recognition measures showed that the greatest recognition (or least denial) occurred when either NI or SFI were presented alone. This finding was further supported by chi square analyses of verbal report data, indicating that SFI delivered in isolation elicited the least defensive reactions (i.e., negative affect and denial) and greater levels of problem recognition than other intervention types. Although the results of the study provided the strongest support for SFI, the authors reinforced that the NI strategy reliably heightened problem recognition over time. They suggested further research into NI strategies delivered in isolation, particularly given that the results of this study did not correspond with those reported in Agostinelli et al. (1995).

Responding to this call, Walters, Bennett, and Miller (2000) recruited 37 heavy drinkers from the University of New Mexico for a comparative study contrasting the effectiveness of a classroom-based NF program with one involving only brief contact by mail. Subjects were randomly assigned to one of three treatment groups: (i) classroom-based normative education and mailed feedback [FT], (ii) mailed feedback only [FO], or (iii) no intervention (control). Those in the FT intervention group attended a 2-hour directed session containing educational, attitudinal, and skill-based strategies encouraging

moderate alcohol consumption. In addition, they received mailed feedback identical to those assigned to the FO treatment condition. As in previous research, the NF information was modeled after the *Drinker's Check Up* (Miller et al., 1988; Miller & Sovereign, 1989), and included the following: personalized feedback on drinking quantity/frequency, peak BAC calculations, personal risk factors (i.e., calculated scores for alcohol problems and genetic risk of alcoholism), drinking quantity relative to sex-adjusted national and campus norms, and percentage of income spent on alcohol in the past year. All subjects were administered a battery of assessment instruments pre-intervention and at six week follow-up by professionals unaware of individual treatment condition. Results of the study showed decreases in alcohol use for both treatment groups: a mean reduction of 27.31 drinks per month for the FT condition, and a mean reduction of 59.37 drinks per month for the FO group. The control group showed a marginal decrease of only 1.53 drinks per month. A one-way ANOVA indicated a significant overall difference in monthly drinking quantity between the three treatments, and the mean difference between the FO and the control group was significant.

Given the success of the previous study, a follow-up investigation was undertaken by Walters (2000). Thirty-four (34) heavy drinkers were randomly assigned into identical treatment conditions: (i) FT, (ii) FO, or (iii) no intervention (control). Given the success of the previous mailed feedback condition however, the FT intervention was altered to include presentation and discussion of normative feedback within the classroom setting. As anticipated, NF delivered in isolation again emerged as the most effective strategy in motivating change to unhealthy drinking patterns. At six week follow-up, a mean decrease of 6.6 drinks per week was determined for the FO group,

compared with mean decreases of only 0.35 drinks per week and 2.75 drinks per week for the FT and control conditions, respectively.

Collins et al. (2002) proposed a RCT that sought to replicate and extend preliminary research on the efficacy of brief mailed NF interventions, drawing upon a larger sample size than studied previously. Using established power analyses, researchers recruited 100 heavy drinkers for random assignment, separately by sex, into either an intervention or a control condition. By mail, participants in the intervention group received a two-page personalized NF form that documented personal alcohol use patterns (i.e., quantity and frequency of drinking and heavy drinking, typical and peak intoxication levels, and alcohol related problems) in conjunction with national and campus sex-specific normative data. In contrast, participants in the control group were mailed a standard psycho-educational brochure on alcohol use. All subjects were also sent a manipulation check questionnaire to ensure that materials were received and read. A battery of assessment instruments were completed on campus by all subjects at baseline and at six-week and six-month follow-up periods. In comparison with students in the control group, students in the NF intervention group reported drinking significantly fewer drinks per heaviest drinking week and experiencing fewer heavy drinking episodes at first follow-up. At second follow-up, however, these findings were no long evident.

Most recently, Neal and Carey (2004) contrasted two brief interventions designed to develop discrepancy in a sample of at-risk college student drinkers (n=183): personal strivings assessment (i.e., exposing conflict between drinking behaviour of self and ideal self), and personalized normative feedback (i.e., exposing conflict between drinking behaviour of self and others). Students randomly assigned to the personal strivings

assessment intervention group received a matrix summarizing how their personal strivings were affected by alcohol use, while those assigned to the personalized NF condition received information on their typical and peak alcohol consumption, presented in contrast to normative data. Participants in the study randomly assigned to an attention-control group received an information pamphlet focusing on the physiological effects of alcohol consumption. One week post-intervention, only the personalized NF group showed significantly higher intention to reduce alcohol consumption when compared with the control group. However, no significant differences in follow-up levels of drinking (e.g., drinks per week, drinking days per week, heavy episodic drinking episodes per week, peak consumption, of drinks per drinking day) were detected for either of the groups.

Research Goals and Rationale

Future research, examining ways in which personalized NF mechanisms may be enhanced, is called for. Two key goals were developed for the present two-part study, both in response to notable gaps in the social norms literature. The goal of *Study 1* was to systematically test the role of specific NF message types in determining follow-up drinking behaviour. The goal of *Study 2* was to qualitatively explore the ways in which students respond receipt of NF. An additional two study goals, secondary to those articulated for Study 1 and Study 2, were also developed.

Study 1

There is a need to further understand the required content of individualized NF information (Baer, Kivlahan, Blume, McKnight, & Marlatt, 2001; Walters, 2000). To date, the large majority of NF messages have been communicated alongside additional

alcohol use feedback (i.e., BAC estimates; risk assessments; problem drinking scores). Only Nye et al. (1999) and Neal and Carey (2004) have indicated that normative messages delivered in isolation have some impact on follow-up drinking behaviour. To date, normative messages delivered in isolation have focused primarily on behavioural norms, or have not distinguished between types of norms (Borsari & Carey, 2001; Trockel et al., 2003). Thus, it remains unclear whether significant changes in norm perception and/or decreases in alcohol use may occur when attitudinal norms are communicated, as shown in some behavioural NF strategies. In fact, despite calls for increasingly rigorous research methods in substance abuse scholarship, specifically those involving no-intervention comparison groups (e.g., Keeling, 2000; Larimer & Cronce, 2002; Ott & Haertlein, 2002), types of norms have not yet been systematically contrasted using a randomized controlled trial [RCT] study design. The primary aim of *Study 1* is to fill this void.

Study 2

There remains a notable shortage of literature probing the ways in which NF interventions function to promote problem recognition and/or healthy behaviour change. Nye et al. (1999) used qualitative research methods in a sample of undergraduate problem drinkers, and found that problem recognition was minimal upon immediate receipt of feedback, but heightened over time. That is, while most students initially voiced concern over the validity of the NF information provided, the intervention reliably heightened problem recognition as participants progressed through the verbal report data collection procedure. The psychological processes underlying this observed change are not well understood, and there remains a critical need to continue research into student reactions

to NF messages. Recently, researchers have voiced concern over the possibility of eliciting negative reactions, particularly defensiveness, when using NF information to compare personal drinking habits to those of other students' (e.g., Nye et al., 1999; Steffian, 1999; Werch et al., 2000). As noted by Berkowitz (2004), NF introduces cognitive dissonance by contradicting popular thought; if NF is rejected, the success of the intervention is compromised.

To date, only a small number of researchers have reported on student responsiveness to NF strategies. Findings by Granfield (2002) were not supportive of NF campaigns (e.g., < 35% of students surveyed reacted favourably; 45% 'tended to believe' the information provided). Werch et al. (2000) also speculated that a lack of believability and credibility for the NF messages used in their social marketing campaign may have accounted for the lack of behaviour change at follow-up. However, findings by Glider et al. (2001) were more supportive of the strategy; most students sampled regarded the intervention as a "reliable and believable source of information regarding safe alcohol consumption" (p. 215). Most students participating in an NF intervention study conducted by Collins et al. (2002) also found that the information provided to them was both useful and personally relevant. Further investigation into how a student interprets social norms messaging is warranted; Berkowitz (2004) has identified this emerging issue as central to the success of future NF activities. Thus, the primary aim of *Study 2* is to advance qualitative understanding of the ways in which students respond receipt of NF.

Secondary Research Goals

Two secondary goals were also developed for this study. Although these goals do not form the basis of this research, by their very nature, the study sample and its

methods of data collection and intervention lend themselves to the advancement of knowledge in two areas that are also gaps in the NF literature.

First, social norms interventions are an emerging trend in Canada; there is anecdotal evidence that NF information, derived from US-based research, has been used within the context of campus alcohol education programs (J. Hancock, Director, Peer Health Educators, University of Alberta, personal communication, May, 2003), and the *Canadian Centre for Social Norms Research* has recently been formed to examine the feasibility of conducting NF interventions on a national scale in this country (refer to http://www.studentlifeeducation.com/norms_about.html). Nonetheless, at the time of writing, there was a notable shortage of research investigating the extent to which students attending university in Canada shared the false perceptions related to 'normal' drinking that American students have been shown to hold (i.e., a view that others are more tolerant of alcohol use; an overestimation of others' drinking quantity/frequency). The present study aimed to contrast perceptions of others' approval for and use of alcohol with actual trends revealed in the *1998 Canadian Campus Survey* (Gliksman et al., 2000), the first national study of alcohol and other drug use among post-secondary students.

Second, the suitability of disseminating NF information electronically (i.e., via a website) has not yet been studied. In a recent review, Copeland and Martin (2004) identified five internet and computer-based interventions for substance use disorders. For example, on-line self-assessments for high-risk drinking were used to generate tailored individual feedback for a large sample of US employees (Matano, Futa, Wanat, Mussman, & Leung, 2000) and for a large general population sample of Canadian adults

(Cunningham et al., 2000). Research into the effectiveness of these sites in lowering alcohol use post-intervention continues; in fact, none of the five interventions included in the review has been formally evaluated (Copeland & Martin, 2004).

The role of computerized feedback is receiving increased attention in substance abuse prevention, particularly given that it has shown promise as an effective health education tool in other areas, notably nutrition education (Burg, Oenema, & Campbell, 2003) and physical activity promotion (Tate, Wing, & Winett, 2001). On-line health promotion interventions are cost-effective, unobtrusive, and have the potential to reach a wide audience of computer users (Eysenbach & Wyatt, 2002). Data collected online are also comparable to data collecting using classical methods. Kapp and Kirk (2003) reported on a number of studies in which young people responded more favourably to online surveys than to traditional survey methods (i.e., pencil and paper; touch-tone telephone; face-to-face interview). Further, McCabe et al. (2002) found that data quality (i.e., consistency; abandonment rates; missing data rates) was not compromised by online survey completion for respondents to the university-based *Core Alcohol and Drug Use Survey* when compared with data collected via mail-based surveys. In this age of advancing technology, there is clear interest in realizing the potential of online research (Copeland & Martin, 2004; Monahan & Costhurst, 2001). With respect to NF programming, web-based interventions are also advantageous in that they provide individualized, immediate feedback. This study aims to contribute to the growing body of literature addressing the need for electronic health promotion interventions.

Overview and Hypotheses

A two-part study was designed to respond to the gaps in the literature identified above. Both *Study 1* and *Study 2* involved the use of online data collection tools to collect participant information at baseline (February, 2004), follow-up time 1 (February, 2004), and follow-up time 2 (March/April, 2004). Using this tool, participants responded to questions in five areas at baseline: (i) demographic information, (ii) personal drinking practices, (iii) perceived social norms, (iv) experience of negative alcohol-related consequences, and (v) problem drinking assessment. After completing the baseline assessment, participants were provided with one of three types of NF (i.e., attitudinal, behavioural, or no feedback [control]). Feedback was derived from the results of the *1998 Canadian Campus Survey* (Gliksman et al., 2000), and was provided in a printable format. At follow-up time 1 (i.e., immediately upon receipt of feedback), students in the experimental conditions were administered a brief online survey probing responsiveness to NF. Finally, at follow-up time 2 (i.e., six weeks following completion of the baseline assessment), participants accessed a second online data collection tool to respond to questions in three areas identical to those used at baseline: (i) personal drinking practices, (ii) perceived social norms, and (iii) experience of negative alcohol-related consequences.

Hypotheses for Study 1

Study 1 investigated the effects of different NF message types on follow-up drinking behaviour using quantitative data analyses. The goal of this phase of the project was to determine which type(s) of electronic NF would contribute to the greatest reductions in follow-up quantity/frequency drinking among students. Hypotheses were as follows: students in the NF experimental conditions will demonstrate greater

reductions in weekly drinking quantity at follow-up, compared with students in the control group [*Hypothesis 1*]; students in the NF experimental conditions will demonstrate greater reductions in weekly drinking frequency at follow-up, compared with students in the control group [*Hypothesis 2*]; students in the NF experimental conditions will demonstrate greater reductions in monthly frequency of heavy episodic drinking at follow-up, compared with students in the control group [*Hypothesis 3*]; students in the NF experimental conditions will demonstrate greater reductions in monthly quantity of peak alcohol consumption at follow-up, compared with students in the control group [*Hypothesis 4*]; students in the NF experimental conditions will demonstrate greater reductions in monthly experience of alcohol related negative consequences at follow-up, compared with students in the control group [*Hypothesis 5*]. Given that there was no a priori research to suggest which NF experimental condition might perform better in isolation, no specific hypothesis was made in this regard.

Hypotheses for Study 2

Study 2 explored the ways in which students interpreted the NF messages they were given using qualitative methods of analysis. Participants responded in written form to an open-ended question designed to evoke student reactions to receipt of NF information. This was followed by three Likert scale items to assess the extent to which students believed the NF information they received to be credible, their scepticism about NF, and how much they were motivated to change their drinking habits as a result of receiving it. The goal of this phase of the study was to replicate and extend preliminary findings presented by Nye et al. (1999). In that study, the authors classified heavy student drinkers' interpretations of NF into one of three general categories: (i) negative

(affective) response to presented information, (ii) denying the accuracy of normative information, or (iii) recognizing the problematic nature of one's drinking behaviour. In the present study, text analysis techniques were used to systematically determine categories of shared interpretations (i.e., those classified by Nye et al. [1999] as well as other themes identified through text analysis), and respondents were coded for the presence or absence of each interpretation. Given that little previous research was published in this area, this study was designed to be primarily exploratory in nature; there were no specific hypotheses developed.

CHAPTER THREE

Methods

Procedure

A randomly selected sample of students was invited to participate in the study through an initial e-mail [see Appendix A] and "reminder" e-mail sent after a one-week interval [see Appendix B]. These notices informed participants that: (i) their e-mail address was selected at random, (ii) they were invited to participate in a confidential online study of campus alcohol use, and (iii) those who completed the research protocol would be eligible for a draw to receive a $200 gift certificate redeemable at the University of Alberta bookstore. At the end of the message, a unique ID code hyperlinked to the study website provided interested students the opportunity to access the baseline assessment. Students recruited between February 10 and February 12, 2004 who experienced technical difficulties while attempting to complete the baseline assessment were sent an additional e-mail asking them to re-access the survey [see Appendix C].

The study website began with an online version of a participant information sheet, describing the proposed research in greater detail [see Appendix D]. It also reviewed participant confidentiality, and stated the study inclusion and exclusion criteria. Inclusion criteria for the study required that participants: (i) be undergraduate students currently enrolled in part-time or full-time studies at the University of Alberta, (ii) fall between the ages of 17 and 25 years, and (iii) be able to communicate using English. Exclusion criteria required that participants: (i) not be currently receiving treatment for alcoholism and/or other drug addiction. After reading the online information sheet,

participants were required to click the checkbox labeled *I am eligible to take part in the study.* Those who attempted to proceed without indicating their eligibility were displayed the following message using a pop-up box: *you need to click the checkbox to proceed. You need to click the checkbox to proceed. You need to click the checkbox to proceed. You need to click the checkbox to proceed.*You need to click the checkbox to proceed. You need to click the checkbox to proceed.

Next, the study website presented an online version of a participant consent form [see Appendix E]. Participants were required to indicate their agreement with each of the six statements on the form by clicking the checkbox following each statement. Those who attempted to proceed without indicating their consent were displayed the following message using a pop-up box: *Please agree to all terms of the study. You will then be able to access the survey.* Finally, participants were required to click on the button labeled *I agree to take part in the study* contained at the bottom of the consent form. This was taken as a final indication of consent to participate in the study. For the participant, the action of clicking the labeled button caused two events: (i) a duplicate copy of the consent form was automatically generated and sent to their e-mail address, and (ii) they were immediately linked to the baseline assessment instrument. All study participants, regardless of experimental condition, completed identical baseline assessment measures.

Baseline Assessment

The baseline assessment instrument [see Appendix F] was used for dual purposes (i.e., collection of baseline data for *Study 1* and generation of personalized NF for students assigned to the NF conditions). The items contained in the instrument drew from published mail-based surveys and in two web-based surveys currently under review

(see http://www.e-chug.com and http://notes.camh.net/efeed.nsf/feedback). The instrument was divided into five areas: (i) demographic information ('About You'), (ii) personal drinking practices ('Your Drinking Profile'), (iii) social norms ('Campus Norms'), (iv) experience of negative alcohol-related consequences ('Alcohol-related Consequences'), and (v) assessment of problem drinking ('More About Your Drinking'). At the end of each section of the survey, a button labeled *next* linked participants to the subsequent section.

Demographic information. Demographic questions (i.e., items 1-6) contained in the instrument drew from others used in previous social norms research conducted among university student populations. Similar items are found in the Alcohol and Drug Use Survey, developed by the Core Institute and used in large-scale studies of university drinking patterns in both the US and Canada (i.e., Baer et al., 2001; Gliksman et al., 2000). These questions were used to confirm that established study inclusion criteria were met (i.e., age, year of study, student status) and to gather information on factors that have been previously found to influence individual alcohol use (i.e., sex, age, year of study, living arrangement, and accommodation type).

Personal alcohol use. The next part of the survey measured personal alcohol use patterns (i.e., items 7-11), where one standard drink was defined according to Canada's Low Risk Drinking Guidelines (i.e., 12 oz [341mL] beer or 5 oz [142 mL] wine or 1.5 oz [43 mL] spirits; Centre for Addiction and Mental Health, 2000). Question 7 determined current drinking status, where current drinkers were defined by having consumed alcohol in the past twelve months. Question 8 asked participants to estimate the number drinks they consumed in a typical week in the month prior to completing the survey. This

measure determined typical drinks per week (quantity) and typical number of drinking days per week (frequency); quantity-frequency measures have been used in alcohol research for more than fifty years (Strauss & Bacon, 1953). Question 8 was written in table format, similar to the Daily Drinking Questionnaire (Dimeff et al., 19999), and incorporated instructions from the period specific normal week approach (Kuhlhorn & Leifman, 1993), which examines typical drinking behaviour as opposed to consumption level in a specific (pre-intervention) week.

Questions 9 and 10 asked students how often they had had four or more drinks on one occasion in the past month, and how often they had had five or more drinks on one occasion in the past month. These measures have been used in multiple student surveys to assess frequency of heavy episodic ('binge') drinking for females and males, respectively. While the traditional definition of binge drinking focused on the consumption of five or more drinks in a row, this was later modified by Wechsler, Moeykens, et al. (1995) to be sex-specific. It must be noted, however, that because the NF derived from the CCS for this study did not refer to sex-specific definitions of binge drinking, only the traditional definition of binge drinking (i.e., the consumption of five or more drinks in a single occasion) was later used in data analysis.

Finally, question 11 evaluated peak alcohol consumption (quantity) in the past month. Recent studies have shown that university students occasionally drink in excess of established definitions of binge drinking (i.e., Gliksman et al., 2000), and that many students define binge drinking differently than do researchers (Wechsler & Kuo, 2000). Thus, questions of this type have been included in previous intervention studies

conducted among this population (i.e., Agostinelli et al., 1995; Collins et al., 2002; Walters, 2000; Walters, Bennett, & Miller, 2000).

Social norms. To measure perceived attitudinal norms for alcohol use, respondents were again asked to think about students of their sex attending university in Alberta, and then to estimate: (i) the percentage of students who agree with the statement *drinking is an important part of the university experience*, (ii) the percentage of students who agree with the statement *it is important to show how much you can drink and still hold your liquor*; (iii) the percentage of students who agree with the statement *you can't make it socially at this university without drinking*. The CCS presented actual normative data using these items, thus students randomly assigned to the attitudinal feedback condition received information contrasting their responses with actual responses from the survey.

To evaluate perceived behavioural norms, respondents were asked to think about students of their sex attending university in Alberta, and then to estimate: (i) the percentage of students who do not use alcohol, (ii) the average number of drinks consumed in a week by students who drink, and (iii) the average number of times in a month students who drink have 5 or more drinks on a single occasion (i.e., items 12-14). These measures were included because the CCS provided actual normative data using these items. Students randomly assigned to the behavioural feedback condition received information contrasting their responses with actual responses from the survey.

Pluralistic ignorance was measured using two items modified from Prentice and Miller (1993), who developed questions for a series of studies that asked students to rank their personal attitudes towards campus alcohol use on a Likert scale, and then to rank the

attitudes of other students using the same scale. These questions (i.e., items 18-19) were selected because pluralistic ignorance is evident when respondents indicate that they are less approving of student drinking practices than are other students (i.e., respondents privately reject campus norms, but believe that other students accept them).

Experience of negative alcohol-related consequences. Recent experience of negative alcohol-related consequences was measured using the Short Index of Problems – 2L (SIP-2L; items 20-34). A brief version of the Drinker Inventory of Consequences (DrInC; Miller, Tonigan, & Longabaugh, 1995), the SIP-2L assesses adverse consequences of excessive alcohol use in five areas: physical, social, intrapersonal, impulse, and interpersonal. Excellent internal consistency and the test-retest reliability have been documented for this instrument (Miller et al., 1995). For this project, the time-frame normally used for the SIP-2L was modified to measure adverse consequences experienced *in the past month*. Scores were summed to indicate a level of alcohol related-problems, where responses of "yes" received one point, and responses of "no" received zero points.

Assessment of problem drinking. The Alcohol Use Disorders Identification Test (AUDIT; Babor, De la Fuente, Sauders, & Grant, 1992) was used to determine risk for problem drinking among subjects (i.e., items 35-44). Widely used in both clinical and research settings, the AUDIT is an instrument for which psychometrics are well established (Allen, Litten, Fertig, & Babor, 1997; Reinert & Allen, 2002). The AUDIT reliably distinguishes between social and heavy drinking, and was previously used to measure problem drinking among US college students in NF studies conducted by Walters (2000) and Walters, Bennett, and Miller (2000). For the purpose of this study, as

with most general population studies, an AUDIT score of 8 or greater was used to indicate problem drinking.

The final item on the baseline assessment (i.e., item 45) asked respondents to indicate whether they had taken part in any other online studies related to alcohol use in the past three months because the Centre for Addiction and Mental Health [CAMH] was recruiting participants for two such studies in the three months before recruitment for the present study began (i.e., November, 2003 – January, 2004). This item was included because it would allow for the detection of significant differences in response items between students who had participated in one or more of the CAMH studies, and those who had not done so.

Once study participants had finished entering information into the fields on the assessment instrument, they were instructed to proceed by clicking button labeled *submit*. The action of clicking this button caused three events. First, the assessment instrument was marked as complete in the database storing the information obtained by the online data collection tool. Second, the date and time of survey completion were recorded in the database, allowing for the time of follow-up assessment (time 2) to be calculated. Third, participants were randomly assigned to one of two feedback conditions (i.e., attitudinal NF or behavioural NF), or to the control condition (i.e., no feedback). A web-scripting language was used to enable randomization in blocks of six. Thus, the first study participant to click *submit* was randomly assigned one of six numbers corresponding to one of three conditions (i.e., 1=attitudinal, 2=attitudinal, 3=behavioural, 4=behavioural, 5=control, 6=control), and the second study participant to click *submit* was randomly

assigned to one of the remaining five numbers. This process continued until all six numbers had been randomly assigned, at which time a new block was started.

Intervention

For respondents in the attitudinal NF group, three messages of this type were displayed on the computer monitor [see Appendix G]. For respondents in the behavioural NF group, three messages of this type were displayed on the computer monitor [see Appendix H]. Both the attitudinal and behavioural NF messages contained actual norms as determined by the 1998 CCS. The actual norms were sex-specific and were specific to undergraduate students attending university in Alberta. This increased the proximity of the normative reference group, and ultimately, increased the relevance of NF to the student population (Borsari & Carey, 2003; Wechsler et al., 2003). The actual norms used in this research were provided by Ms. Brenda Newton-Taylor, Research Associate, Social, Prevention and Health Policy Research Department, Centre for Addiction and Mental Health.

Once students in the NF conditions had received their feedback, they were reminded that the information displayed could be printed. This statement was followed by a button labeled *next*. The action of clicking the button closed the feedback information displayed on the monitor and opened the follow-up assessment (time 1) for respondents in both NF conditions. Students in the delayed-treatment control group received no NF. The action of submitting the baseline assessment instrument linked these respondents directly to a brief message concluding the study [see Appendix I]. This message contained referral information to local sources for questions or concerns related

to alcohol use, as well as a reminder that an e-mail regarding the follow-up survey would be sent in approximately six weeks.

Follow-up Assessment (Time 1)

The purpose of the follow-up assessment (time 1) [see Appendix J] was to gather data for *Study 2* (i.e., open-ended data documenting reactions toward NF). Thus, participation is this part of the study was limited to those who had been randomly assigned to receive feedback of a specific type; because students in the control group did not receive an intervention, their interpretations of NF could not be measured. The follow-up assessment (time 1) began with a single open-ended question that asked respondents to describe their first reactions to the NF information they had received, using words or phrases to express their feelings (i.e., item 1). This item was developed specifically for this research, however, it loosely parallels a question used in research by Nye et al. (1999), in which participants students were instructed to verbalize their immediate reactions to NF into a tape recorder. It was anticipated that students would use written words and phrases comparable to those expressed verbally (e.g., "I guess I need to make some changes in the amount of alcohol I drink"). Next, three Likert-scale items developed uniquely for this study (i.e., items 2-4) were used to measure levels of perceived credibility and skepticism toward the NF information received, and motivation to change in response to NF. Finally, four items assessing reasons for changing alcohol consumption were presented. These items were written for this study and were derived from self-determination theory (Deci & Ryan, 1985).

Once study participants in the NF conditions had finished entering information into the fields on the follow-up assessment (time 1), they were instructed to proceed by

clicking button labeled *submit*. The action of clicking this button linked them immediately to a brief message concluding the survey. This message was identical to that which respondents in the delayed-treatment control group received [see Appendix I]; it contained referral information to local sources for questions or concerns related to alcohol use, as well as a reminder that an e-mail message regarding the follow-up survey would be sent in approximately six weeks.

Follow-up Assessment (Time 2)

Six weeks post-intervention, based on date of initial survey completion, all study participants who completed a baseline assessment were sent electronic messages inviting them to participate in the follow-up portion of the study [see Appendix K], and reminding them of this opportunity after a one-week interval [see Appendix L]. Although most previous NF intervention studies have employed a follow-up period of one month post-intervention, the timing for follow-up in this study was lengthened order to avoid participant recall of spring break drinking patterns. Ultimately, most respondents were expected to complete the follow-up assessment (time 1) just prior to spring break (i.e., mid-February) and the follow-up assessment (time 2) after six weeks (i.e., end March). Questions related to personal alcohol use patterns retained the reference period of "in the previous month," thereby avoiding recall of the spring break period (i.e., end February). Participants interested in completing the follow-up were directed to the study website using a hyperlink included at the end of the e-mail message. All participants were directed to the same online instrument regardless of the experimental condition to which they were previously assigned.

The follow-up assessment (time 2) instrument began with a brief message re-orienting students to the study and reminding them of its purpose [see Appendix M]. It then employed a similar framework to that of the baseline assessment. The follow-up (time 2) instrument [see Appendix N] was comprised of identical measures in the following areas: (i) personal drinking profile (i.e., items 1-5), (i) perceived campus norms (i.e., items 6-11), and (iii) experience of negative alcohol-related consequences (i.e., items 12-26). Previous studies have shown these methods to be sufficient in determining the role of NF interventions in reducing high risk drinking patterns (i.e., changing perceived norms, lowering the weekly/monthly quantity and frequency with which drinking and heavy episodic drinking occur, and reducing the experience of alcohol-related consequences). In order to reduce duplication, the follow-up instrument did not require that participants complete demographic information or respond to the two items measuring pluralistic ignorance. Items based on the assessment of problem drinking were also excluded; given that the time frame for the AUDIT is one year prior to completion, the utility of repeating this measure at six-week follow-up was limited.

Once study participants had finished entering information into the fields on the instrument, they were instructed to proceed by clicking button labeled *submit*. The action of clicking this button caused three events. First, the study protocol was marked as *complete* in the database storing the information entered into the study website. Second, the date and time of survey completion were recorded in the database. Third, a brief message concluding the study was generated on the computer monitor [see Appendix O]. Again, it thanked respondents for their participation in the study and referred them to sources of information for questions or concerns related to alcohol use.

Sample Recruitment

Participants for both *Study 1* and *Study 2* were undergraduate students at the University of Alberta. Ethical approval to conduct the research was granted by the Health Research Ethics Board, Panel B, University of Alberta. The research protocol was found to be fully compliant with the provisions of the *Freedom of Information and Protection of Privacy Act*, and as such, approval to access to personal information (i.e., 1400 student e-mail addresses) was granted by University officials. Participant recruitment and retention is summarized in Figure 1 using the CONSORT conventions for reporting randomized controlled trials (Moher, Schultz, & Altman, 2001).

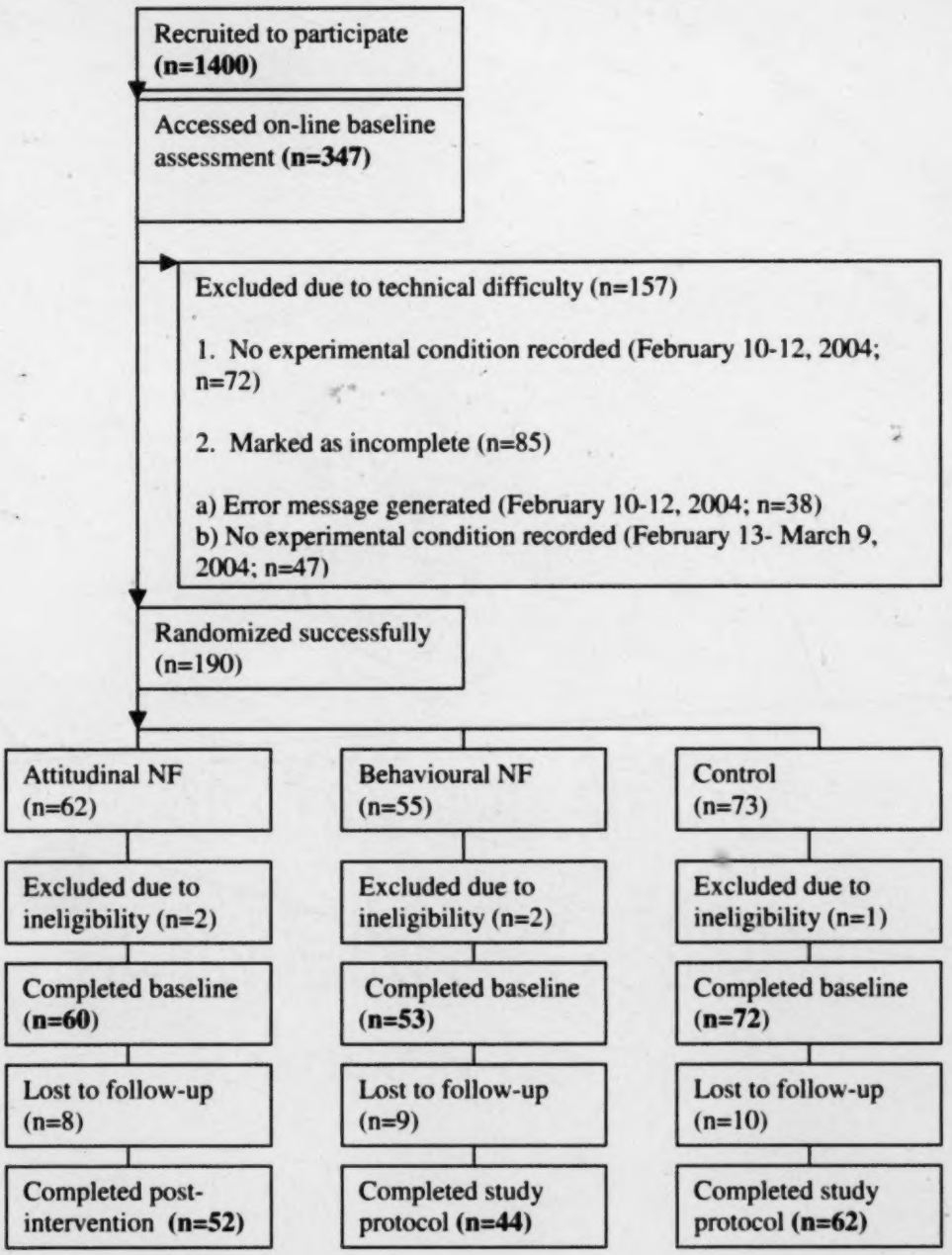
Recruited to participate (n=1400)
Accessed on-line baseline assessment (n=347)
Excluded due to technical difficulty (n=157)
1. No experimental condition recorded (February 10-12, 2004; n=72)
2. Marked as incomplete (n=85)
a) Error message generated (February 10-12, 2004; n=38)
b) No experimental condition recorded (February 13- March 9, 2004; n=47)
Randomized successfully (n=190)
Attitudinal NF (n=62)
Behavioural NF (n=55)
Control (n=73)
Excluded due to ineligibility (n=2)
Excluded due to ineligibility (n=2)
Excluded due to ineligibility (n=1)
Completed baseline (n=60)
Completed baseline (n=53)
Completed baseline (n=72)
Lost to follow-up (n=8)
Lost to follow-up (n=9)
Lost to follow-up (n=10)
Completed post-intervention (n=52)
Completed study protocol (n=44)
Completed study protocol (n=62)

Figure 1. Overview of Study Procedures

In total, a random sample of 1400 student e-mail addresses (i.e., campus computing IDs [CCIDs] ending with the extension @ualberta.ca) was provided by Computer and Networking Services [CNS]. CNS maintains CCIDs for all those in the University of Alberta community with one or more of the following roles: (i) student, (ii) employee, and/or (iii) guest. CCIDs for which employee or guest roles were assigned were eliminated prior to randomization, thereby reducing the possibility of including graduate students, who normally maintain employee roles in addition to student roles. This recruitment strategy is an example of *list-based sampling*, in that the sample was drawn from a high coverage population frame (i.e., an estimated 25, 000 current undergraduate students at the University of Alberta are currently assigned CCIDs; K. Crossman, Team Leader Internet Applications, Computing and Network Services, Personal Communication, January, 2004).

Based on previous online research reviewed, it was initially determined that 900 students should be invited to participate in the study. It was forecasted that 30% (270) would complete the online baseline assessment, and of these, 50% (135) would complete the research protocol. With this follow-up sample size of 135 (45 students per condition), it was determined that the study had a 82% power to detect group differences in alcohol consumption at six-week follow-up, using a conventional two-tailed alpha=.05. This power calculation assumed a medium effect size (f=0.25), and that baseline alcohol use accounted for 20% of the variance in follow-up drinking behaviour.

Within the first three days of recruitment for the study (February 10 – 12, 2004), 154 students responded to the initial invitation to complete the study by accessing the study website. Of these, 82 students were unable to complete the baseline assessment in

its entirety; it was hypothesized by the website developers that some students may have encountered an error message prior to completing the last item on the assessment. Given that these students had not yet been randomized to an experimental condition, they were contacted via e-mail and asked to re-complete the baseline assessment. Forty-four students (53.7%) complied with this request, thereby providing useable baseline data. Thirty-eight students (46.3%) did not re-do the baseline assessment, providing no useable baseline data. A further 72 students completed the baseline assessment in its entirety, however, due to technical error, the experimental condition to which each participant was assigned was not recorded by the online data collection tool. Given that these students had agreed to complete the research protocol, they were retained through follow-up (time 2). However, the data they provided were not used for analyses.

Due to the amount of missing and/or lost data encountered during the first three days of data collection, the proposed sampling plan was not longer considered adequate to test the study hypotheses. An additional 500 students were therefore invited to participate. Baseline data collection continued through March 9, 2004, however, technical difficulties continued to plague the data collection process. A further 47 students who completed the baseline assessment did not successfully have their experimental conditions recorded. In the end, 1400 students were informed of the study and its purposes. Although 347 students (24.8%) accessed the baseline assessment, only 190 (54.8%) of these records were retained in the data set. Of these 190 respondents, five (2.6%) were excluded due to ineligibility (i.e., age greater than 25 years and/or post-graduate students). The remaining 185 were randomized into one of three conditions:

32.9% received attitudinal NF (n=60), 27.8% received behavioural NF (n=53), and 39.2% were assigned to the delayed-treatment control group (n=72).

At follow-up (time 2), participant retention rates exceeded 80% in all three groups: 52 students (86.7%) assigned to the attitudinal NF condition completed the follow-up assessment, as did 44 students (83.0%) assigned to the behavioural NF condition, and 62 students (86.1%) assigned to the control group. Altogether, 158 complete data sets were retained.

CHAPTER FOUR

Analysis and Results

Overview

This chapter begins by presenting the demographic characteristics and pre-intervention drinking patterns of study participants in the baseline sample (N=185). It then describes analysis of variance [ANOVA] procedures used to examine differences between those participants who completed the research protocol (n=158) and those who did not complete the follow-up (time 2) assessment (n=27). Next, the methods for determining the final data set (now called the RCT data set; n=114) at follow-up (time 2) are summarized. The RCT data set at was systematically reviewed for outliers and for responses submitted by non-drinkers. Equivalence of experimental groups was also examined with respect to demographic characteristics and baseline drinking measures, and effectiveness of the experimental manipulation was assessed.

Next, the *Main Analyses: Study 1* section of the chapter presents evidence of normative misperceptions at baseline, and goes on to test the study hypotheses. Analysis of covariance [ANCOVA] was used to test the hypotheses that students assigned to the NF conditions would demonstrate changes in drinking behaviour at follow-up, compared with students assigned to the control condition. Interaction effects of sex and problem drinking status were also examined. Difference scores were then calculated for changes in perceived norms at baseline and follow-up (time 2), and ANOVA was used to detect significant differences between groups.

The *Main Analyses: Study 2* section of the chapter discusses student responsiveness to the NF interventions. Tables are presented in which categories of

responses were systematically organized together to display the range of participants' experiences. The believability of the NF messages presented in both the attitudinal and the behavioural interventions are also discussed, with reference to mean scores of credibility and skepticism.

Characteristics of the Baseline Sample

Demographics

Of the 185 students who completed the baseline survey, most (60%) were female. The mean age of the respondents was 20.5 years (SD=1.9), and the large majority (88.1%) attended the University of Alberta on a full-time basis. Distribution by year of undergraduate study was comparable from first through to fourth year. Most students (88.3%) indicated that they lived in a house or apartment off-campus, although a small group (16.2%) reported that they lived on campus in a residence or fraternity/ sorority house. Table 1 presents the descriptive statistics of the demographic characteristics for the baseline sample.

Table 1

Demographic Characteristics of the Baseline Sample

	Baseline participants (n=185)
Sex	
Male	74 (40.0%)
Female	111 (60.0%)
Student status	
Full-time student	163 (88.1%)
Part-time student	22 (11.9%)

Student Status	
First year undergraduate	44 (23.8%)
Second year undergraduate	47 (25.4%)
Third year undergraduate	48 (25.9%)
Fourth year undergraduate	46 (24.9%)
Age (M, SD)	20.5 (1.9)
Type of Housing	
Live on campus	155 (83.8%)
Live off campus	30 (16.2%)

Baseline Alcohol Use

In line with findings of the CCS, the large majority of those who completed the baseline survey (85.9%) were identified as current drinkers (i.e., they had consumed alcohol in the year prior to being recruited for the study). These students (n=159) reported on their drinking patterns in the month prior to intervention; other cases (n=26) were treated as missing data. The mean number of drinks consumed during a typical week at baseline was 8.6 (SD=12.3). The mean number of drinking days during a typical week at baseline was 2.1 (SD=1.6).

With reference to heavy episodic drinking (i.e., the consumption of 5 or more drinks in one occasion), more than half of respondents (56.7%) reported that they had engaged in this activity at least once in the month prior to being surveyed, and more than one-third (37.8%) reported that they had done so at least twice during the same period. On average, current drinkers engaged in heavy episodic drinking 2.5 times (SD=5.1) in the previous month (M=4.2, SD=7.4).

All students in the baseline sample (i.e., current drinkers and non-drinkers alike; n=185) completed both the SIP and the AUDIT measurements. The mean SIP score of the total sample was 1.9 (SD=2.7), indicating that few negative alcohol-related consequences were experienced in the month prior to being surveyed. The mean AUDIT score of the total sample was 6.6 (SD=4.7). One-third of respondents (30.8%) scored eight or greater on the AUDIT, classifying them as problem drinkers. Table 2 presents the descriptive statistics of the baseline drinking characteristics for the baseline sample.

Table 2

Baseline Alcohol Use of the Baseline Sample

	Baseline participants (n=185)
Current drinker (had any alcohol in past 12 months)	
Yes	159 (85.9%)
No	26 (14.1%)
Typical number of drinks per week (M, SD)	
Current drinkers	8.6 (12.3)
Typical number of drinking days per week (M, SD)	
Current drinkers	2.1 (1.6)
Maximum number of drinks consumed in one sitting, past month (M, SD)	
Current drinkers	6.6 (6.1)
Engaged in heavy episodic drinking (5+ drinks) at least once in past month	
Current drinkers	89 (56.7%)
Engaged in heavy episodic drinking (5+ drinks) at least twice in past month	
Current drinkers	59 (37.8%)

Number of times 5+ drinks were consumed in one sitting, past month (M, SD)	
Current drinkers	2.5 (5.1)
Total SIP score (M, SD)	
Total sample	1.6 (2.6)
Total AUDIT score (M, SD)	
Total sample	5.7 (4.9)
AUDIT score 8 or greater	
Total sample	56 (30.8%)

Attrition Analyses

Demographics

The large majority (85.4%) of the 185 students who completed the baseline assessment were retained throughout the duration of the study. Chi-square tests and independent sample t-tests were performed to determine whether those who completed the research protocol in its entirety (n=158) and those who did not do so (n=27) differed with respect to experimental condition, demographic characteristics, or baseline alcohol use measures. Homogeneity of variance was tested for continuous variables (i.e., age; typical drinks per week; typical drinking days; peak drinking quantity; heavy episodic drinking frequency; SIP score; AUDIT score) using *Levene's statistic*, and was non-significant for all except typical drinking days and heavy episodic drinking frequency. For these two variables, ln transformations were conducted to equalize the variances.

It was determined that students lost to follow-up did not differ from those retained in the study with respect to experimental condition or the three demographic variables (i.e., sex, age, year of study; $p>0.05$) that could be examined without violating the

assumptions of the chi square test (i.e., no more than 20% of the categories should have expected frequencies of less than five). Table 3 presents the demographic characteristics of those who completed the research protocol and those who did not do so.

Table 3

Demographic Characteristics of Complete (n=158) vs. Incomplete (n=27) Participants

	Incomplete follow-up (n=27)	Complete follow-up (n=158)	Total (n=185)
Experimental condition			
Attitudinal	8 (29.6%)	52 (32.9%)	60 (32.4%)
Behavioural	9 (33.3%)	44 (27.8%)	53 (28.6%)
Control	10 (37.0%)	62 (39.2%)	72 (38.9%)
Sex			
Male	12 (44.4%)	62 (39.2%)	74 (40.0%)
Female	15 (55.6%)	96 (60.8%)	111 (60.0%)
Age (M, SD)	20.8 (2.3)	20.5 (1.9)	20.5 (1.9)
Year of undergraduate study			
First	10 (37.0%)	34 (21.5%)	44 (23.8%)
Second	3 (11.1%)	44 (27.8%)	47 (25.4%)
Third	7 (25.9%)	41 (25.9%)	48 (25.9%)
Fourth	7 (25.9%)	39 (24.7%)	46 (24.9%)

Baseline alcohol use

With respect to baseline alcohol use, only one measure varied across study groups; a greater proportion of those lost to follow-up (48.1%) scored 8 or higher on the AUDIT, when compared with those retained (27.7%); χ^2 (1) = 4.495, (p=0.034). Table 4 contrasts the untransformed baseline alcohol use measures for the two groups.

Table 4

Baseline Alcohol Use of Incomplete (n=27) vs. Complete (n=158) Data Sets

	Incomplete follow-up (n=27)	Complete follow-up (n=158)	Total (n=185)
Current drinker (had any alcohol in past 12 months)			
Yes	24 (88.9%)	135 (85.4)	159 (85.9%)
No	3 (11.1%)	23 (14.6%)	26 (14.1%)
Typical number of drinks per week (M, SD)	10.0 (12.8)	8.3 (12.3)	8.6 (12.3)
Typical number of drinking days per week (M, SD)	2.5 (2.0)	2.1 (1.5)	2.1 (1.6)
Maximum number of drinks consumed in one sitting, past month (M, SD)	7.2 (5.3)	6.5 (6.2)	6.6 (6.1)
Engaged in heavy episodic drinking (5+ drinks) at least once in past month	15 (62.5%)	74 (55.6%)	89 (56.7%)
Engaged in heavy episodic drinking (5+ drinks) at least twice in past month	8 (33.3%)	51 (38.6%)	59 (37.8%)
Number of times engaged in heavy drinking (5+ drinks), past month	3.8 (10.2)	2.3 (3.4)	2.5 (5.1)
Total SIP score (M, SD)	1.5 (2.2)	1.7 (2.7)	1.6 (2.6)

Total AUDIT score (M, SD)	7.0 (5.3)	5.5 (4.8)	5.7 (4.9)
AUDIT score 8 or greater*	13 (48.1%)	43 (27.7%)	56 (30.8%)

*p<.05

Inclusion Criteria for the RCT Sample

Prior to hypotheses testing for *Study 1*, distributions for the alcohol variables of complete data sets at follow-up (time 2) were reviewed to identify outliers. Cases were deleted if any of the following conditions were met: (i) drinks per week pre-or post-intervention >50, (ii) maximum number of drinks in a single occasion pre-or post-intervention >25, (iii) number of times 4+ drinks were consumed in a single occasion, past month, pre- or post intervention >25, (iv) number of times 5+ drinks were consumed in a single occasion, past month, pre- or post-intervention >25. A total of five cases were deleted for one or more of these reasons.

Finally, cases were deleted for those participants who reported not having had any alcohol in the year prior to completing the baseline assessment (n=23). Cases were also deleted for those who reported having used alcohol in the past year, but who did not report consuming alcohol during a typical week in the month prior to completing the baseline assessment (n=16). In the end, a total of 114 participants were retained for analyses, randomly assigned to one of three conditions: attitudinal (n=33), behavioural (n=34), or delayed-treatment control (n=47).

Characteristics of the RCT Sample and Equivalence of Groups

In order to determine whether randomization had succeeded in creating equivalent groups at baseline, the conditions were compared on both demographic characteristics and baseline alcohol use measures.

Demographics

The number of females outweighed the number of males in each condition, as did the number of students studying on a full-time basis. Most respondents (82.5%) lived in house or apartment off-campus, while 17.5% resided in a campus residence or fraternity/sorority house. Distribution by year of study was similar for each experimental condition, and mean age of participants was comparable for each group. Chi square analyses and a one-way ANOVA determined that there were no significant differences ($p>.05$) across the three groups on these demographic variables. Table 5 presents demographics of the RCT sample.

Table 5

Demographic Characteristics of the RCT Sample

	Attitudinal NF (n=33)	Behavioural NF (n=34)	Control (n=37)	Total (n=114)
Sex				
Male	9 (27.3%)	14 (41.2%)	16 (34.0%)	39 (34.2%)
Female	24 (72.7%)	20 (58.8%)	31 (66.0%)	75 (65.8%)
Year of study				
First year	9 (27.3%)	7 (20.6%)	6 (12.8%)	22 (19.3%)
Second year	8 (24.2%)	10 (2.4%)	13 (27.7%)	31 (27.2%)
Third year	7 (21.2%)	11 (32.4%)	16 (34.0%)	34 (29.8%)
Fourth year	9 (27.3%)	6 (17.6%)	12 (25.5%)	27 (23.7%)
Age (M, SD)	20.4 (1.9)	20.4 (1.7)	20.7 (1.8)	20.5 (1.8)

Type of housing				
Live off campus	26 (78.8%)	27 (79.4%)	41 (87.2%)	94 (82.5%)
Live on campus	7 (21.2%)	7 (20.6%)	6 (12.8%)	20 (17.5%)

Baseline Alcohol Use

One-way ANOVAs determined that there were no significant differences ($p>.05$) between groups for typical number of drinks per week, typical number of drinking days per week, or maximum number of drinks consumed in a single occasion. In the month prior to completing the baseline assessment, participants in the attitudinal condition drank an average of 9.4 drinks per week, while those in the behavioural and control conditions consumed an average of 7.5 and 6.4 drinks per week, respectively. All three groups were similar in number of drinking days per week and in peak consumption level.

Heavy episodic drinking also did not differ across groups. For each condition, most participants (i.e., > 50%) had consumed 5 or more drinks in one sitting at least once in the past month, and more than 40% had done so at least twice in the past month. The mean number of times in the past month that five or more drinks were consumed in one sitting was similar across each condition.

In reference to total SIP score, used as a measurement of negative consequences of alcohol use, participants assigned to the control condition reported a mean SIP score of 2.7 (SD=3.6); those assigned to the attitudinal and behavioural conditions reported mean scores of 1.8 (SD=2.1) and 1.8 (SD=1.6), respectively. No significant differences between groups were detected for this variable (transformed) using ANOVA.

Total AUDIT score, used as an index of problem drinking, was also comparable across each experimental group. One-way ANOVAs determined that there were no significant differences ($p>.05$) between groups for total AUDIT score or for AUDIT score of 8 or greater. Some 38.7% of students in the attitudinal condition, 26.5% of students in the behavioural condition, and 38.3% of those in the control condition were classified as problem drinkers. Table 6 outlines the untransformed baseline drinking characteristics for the three groups.

Table 6

Baseline Alcohol Use of the RCT Sample

	Attitudinal (n=33)	Behavioural (n=34)	Control (n=47)	Total (n=114)
Typical number of drinks per week (M, SD)	9.4 (9.4)	7.5 (7.6)	6.4 (7.6)	7.6 (7.6)
Typical number of drinking days per week (M, SD)	2.5 (1.6)	2.2 (1.0)	2.1 (1.2)	2.2 (1.3)
Maximum number of drinks consumed in one sitting, past month (M, SD)	7.9 (6.2)	6.6 (4.6)	6.1 (4.9)	6.8 (5.2)
Engaged in heavy episodic drinking (5+ drinks) at least once in past month	22 (66.7%)	22 (64.7%)	26 (56.5%)	70 (61.9%)
Engaged in heavy episodic drinking (5+ drinks) at least twice in past month	15 (45.5%)	14 (41.2%)	18 (40.0%)	47 (42.2%)

Number of times engaged in heavy drinking (5+ drinks), past month (M, SD)	2.8 (3.4)	2.1 (2.7)	2.0 (2.8)	2.2 (3.0)
Total SIP score (M, SD)	1.8 (2.1)	1.8 (1.6)	2.7 (3.6)	2.0 (2.8)
Total AUDIT score (M, SD)	7.4 (4.9)	5.9 (3.3)	6.7 (4.7)	6.6 (4.4)
AUDIT score 8 or greater (M, SD)	12 (37.8%)	9 (26.5%)	18 (38.3%)	39 (34.8%)

Effectiveness of the Experimental Manipulation

As a manipulation check, the final question on the follow-up assessment asked respondents whether they remembered reading information on the study website related to: (i) Canadian university students' beliefs about the role of alcohol in campus life, and (ii) how much and how often Canadian university students drink alcohol. Interestingly, 63.6% of participants assigned to the attitudinal NF condition recalled receiving feedback of that type, as did 76.5% of students assigned to the behavioural NF condition; this suggests that students may not have distinguished between type of norms used in the intervention at recall. Only 12.8% of participants in the control condition indicated that they had previously received attitudinal feedback on the study website. There was a significant difference between the three groups for attitudinal NF recall, $\chi^2(2)=37.672$, ($p<.000$).

A total of 28 (82.4%) participants assigned to the behavioural NF condition recalled receiving feedback of that type, while 24 (72.7%) participants assigned to the

attitudinal condition also believed that they had done so; this supports the hypothesis that students did not distinguish between type of norms used in the intervention at recall. Again, only 6 (12.8%) of participants in the control condition recalled having received behavioural NF. There was a significant difference between the three groups for this variable, χ^2=47.097, (2df, p<.000).

Main Analyses: Study 1

Evidence of Norm Misperceptions at Baseline

There is some evidence to suggest that at baseline, respondents in the RCT sample shared false perceptions related to 'normal' alcohol use, similar to those which American students have been shown to hold (i.e., an overestimation of others' drinking quantity/frequency; a view that others are more tolerant of alcohol use). Table 7 contrasts RCT respondents' perceptions of approval for and use of alcohol with actual trends revealed in the CCS.

Table 7

Baseline Perceived and Actual Norms (Sex-specific)

	Perceived Norm (Male)	Actual Norm (Male)	Perceived Norm (Female)	Actual Norm (Female)
1. Estimate percentage of [male/female] students who report not using alcohol	19.1%	15.8%	23.7%	14.7%
2. Average number of drinks consumed in a week by [male/female] students who drink	10.9	5.6	6.6	4.4

3. Average number of times in a month [male/female] students who drink have 5 or more drinks in a single occasion	6.0	2	3.5	1
4. Percentage of [male/female] students who agreed with the statement: "Drinking is an important part of the university experience"	44.5%	28.9%	37.0%	23.1%
5. Percentage of [male/female] students who agreed with the statement: "It is important to show how much you can drink and still hold your liquor"	28.4%	18.8%	22.1%	16.7%
6. Percentage of [male/female] students who agreed with the statement: "You can't make it socially at this university without drinking"	28.7%	10.6%	21.0%	11.5%

Although it was anticipated that respondents would falsely believe that non-drinking is less prevalent than is actually the case, both male and female students overestimated the percentage of non-drinkers. As expected in all other cases however (i.e., behavioural items 2-3 and attitudinal items 4-6), normative estimates were in the expected direction. Notably, with respect to behavioural norms, the mean estimate for *average number of drinks consumed in a week by male students who drink* was nearly double that determined by the CCS. The mean estimate for *average number of times in a month that male students who drink have 5 or more drinks in a row* was triple that determined by the CCS; female respondents also estimated a heavy drinking frequency that was slightly more than three times that of the actual trend. With respect to attitudinal

norms, the mean estimate for percentage of students who agreed with the statement *drinking is an important part of the university experience* overestimated by males by more than 35%, but overestimated by females by only 13.9%. In fact, Table 7 indicates that women in the study were more able to accurately predict same-sex attitudinal norms than were male respondents.

There is also some evidence to suggest that pluralistic ignorance exists in the sample (not shown in Table 7). Recall that respondents were asked to indicate the extent to which they approve of the drinking habits of other students, using a scale anchored at 1 (*I completely disapprove*) and 10 (*I completely approve*). They were also asked to indicate the extent to which they believed other students approved of their own drinking habits, using a scale anchored at 1 (*They completely disapprove*) and 10 (*They completely approve*). In reference to personal levels of approval for student drinking, men in the sample (n=39) had a mean score of 6.3 (SD=2.2), with scores ranging from 1.0 to 10.0. In reference to their beliefs about others' approval for student drinking, they had a mean score of 7.0 (SD=1.5), with scores ranging from 4.0 to 1.0. A similar trend was found among women in the sample (n=75). Women rated their personal approval of others' drinking at 5.9 (SD=1.7), with scores ranging from 2.0 to 10.0. However, they rated others' approval of student drinking at 7.4 (SD=1.5), with scores ranging from 4.0 to 10.0. As anticipated, these results show that respondents in this sample believed that their peers were more approving of alcohol use than they were personally.

Evidence of Behaviour Change at Follow-up

Recall that the primary goal of S*tudy 1* was to determine which type(s) of electronic NF would contribute to the greatest reductions in follow-up drinking

quantity/frequency and negative drinking consequences among participants retained in the RCT sample. Five hypotheses were developed prior to the onset of the research. Each hypothesis predicted follow-up behaviour change among students in the NF conditions, relative to those in the control condition, on five dependent variables: (i) typical number of drinks per week post-intervention; (ii) typical number of drinking days per week post-intervention; (iii) typical frequency of heavy episodic drinking post-intervention; (iv) peak alcohol consumption post-intervention; (v) number of negative consequences of alcohol use experienced post-intervention.

One-way analysis of covariance [ANCOVA] was used to determine whether the means on each dependent variable were different across experimental condition, adjusting for differences on the covariate (i.e., the corresponding baseline measure). The study design for *Study 1* meets the assumptions of one-way ANCOVA testing, given that all respondents to the survey were measured pre-intervention, all respondents were randomly assigned to different groups, each group received a different treatment, and all respondents were subsequently measured post-intervention (Green, Salkind, & Akey, 2000). Thus, the one-way ANCOVA procedure was considered adequate to test the study hypotheses. Adjusted means, which took into account the fact treatment groups had different means on the covariate, were computed using this procedure.

For each of the five ANCOVAs, the fixed factor was experimental condition (i.e., attitudinal NF, behavioural NF, or control). The dependent variable was one of the five follow-up drinking measures derived from the follow-up assessment, and the covariate was the corresponding baseline drinking measure derived from the baseline assessment.

Five null hypotheses stated that for each ANCOVA, the adjusted means would be equal across experimental condition.

Preliminary analyses were conducted to evaluate the homogeneity-of-slopes assumption. Each test evaluated the interaction between the covariate (i.e., baseline drinking measure) and the factor (i.e., experimental condition) in the prediction of the dependent variable (i.e., follow-up drinking measure). Each test was non-significant ($p > .05$), indicating that the differences on the dependent variable among groups did not vary as a function of the covariate, and that the results of each ANCOVA could be considered meaningful.

Table 8 presents the mean baseline and follow-up measures for each of the five dependent variables by experimental condition. The results of each ANCOVA were non-significant ($p > .05$), indicating that there were no relationships between experimental condition and follow-up drinking behaviour, controlling for baseline drinking behaviour. For each of the five variables, there were no significant differences among the adjusted means for the three experimental conditions. Ultimately, the null hypotheses must be retained. Note that for the fifth ANCOVA, for which follow-up SIP score was the dependent variable and baseline SIP score the covariate, *Levene's statistic* was significant ($p = < .05$), and a ln transformation was conducted to stabilize the unequal variances. However, untransformed data appears in Table 8.

Table 8

Participants' Mean Baseline and Follow-up (time 2) Alcohol Use, by Experimental Condition

	Attitudinal NF		Behavioural NF		Control	
	Baseline (M, SD)	Follow-up (M, SD)	Baseline (M, SD)	Follow-up (M, SD)	Baseline (M, SD)	Follow-up (M, SD)
Drinks, per week	9.4 (9.4)	7.8 (8.8)	7.5 (7.6)	6.5 (7.0)	6.4 (7.6)	6.3 (9.2)
Drinking days, per week	2.5 (1.6)	2.3 (1.8)	2.2 (1.0)	1.9 (1.2)	2.1 (1.2)	1.9 (1.8)
Heavy episodic drinking episodes, per month	2.8 (3.4)	2.2 (3.3)	2.1 (2.7)	1.9 (2.9)	2.0 (2.8)	1.6 (2.4)
Maximum number of drinks consumed in one occasion, per month	7.9 (6.2)	6.7 (5.7)	6.6 (4.6)	4.9 (3.3)	6.1 (4.9)	5.6 (4.9)
SIP score	1.8 (2.1)	2.0 (2.4)	1.8 (1.6)	1.1 (1.8)	2.7 (3.6)	2.6 (3.7)

Next, factorial ANCOVAs were conducted to explore whether the effect of NF might differ for males versus females, or for problem drinkers versus non-problem drinkers. The first set of analyses used both *experimental condition* and *sex* as fixed factors, while the second set of analyses used *experimental condition* and *problem drinking status* as fixed factors. Given the small size of the sample when distributed across experimental condition, it was not possible to examine a three-way interaction (i.e., using *experimental condition*, *sex*, and *problem drinking status* as fixed factors).

The first set of analyses revealed two significant interaction effects. First, there was a significant interaction between experimental condition and respondent sex, for the typical number of drinks per week consumed at follow-up (time 2) ($F,(2,107)=3.489$, $p=.034$). However, it must be noted that for this interaction, *Levene's statistic* was significant ($p=.001$). A ln transformation was conducted in an attempt to stabilize the unequal variances, but the statistic remained significant ($p=.039$) when transformed data was used. Using transformed data, the interaction effect was only marginally significant ($F(2,107)=2.447$, $p=.091$). Ultimately, the results of this interaction should be interpreted with caution. There is some evidence to suggest that the effect of the condition on drinking quantity post-intervention was different for male participants than it was for female participants. Figure 2 presents a bar graph that helps to explain the nature of this interaction effect, using untransformed data.

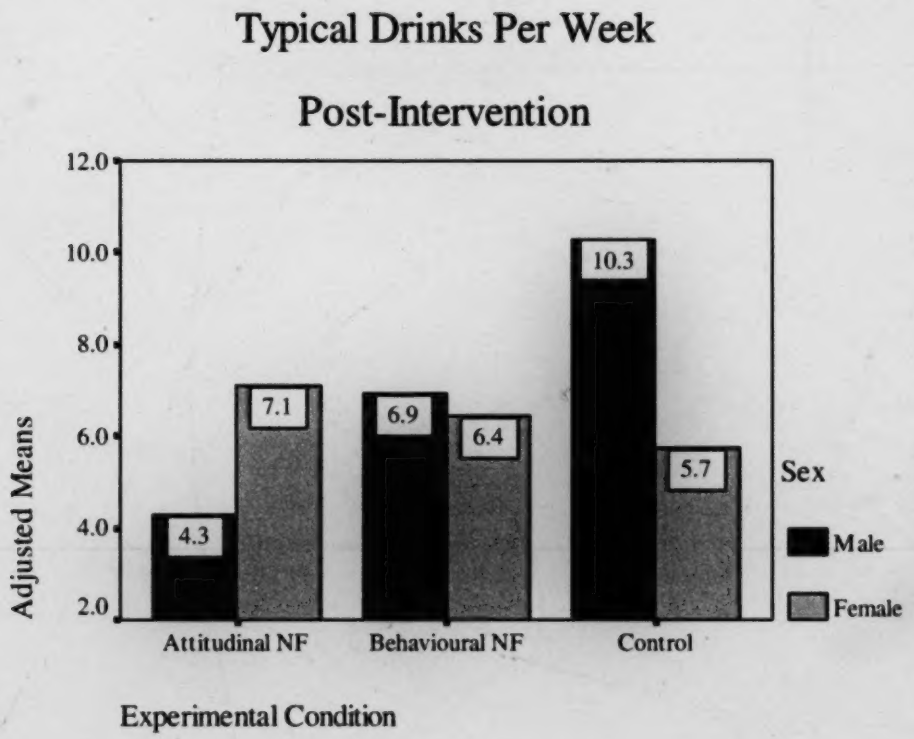

Figure 2. Follow-up Drinks Per Week, By Sex and Experimental Condition

Figure 2 shows that for women, experimental condition had very little effect; typical weekly drinking quantity at follow-up (time 2) was quite stable across the three conditions. However, men in the control condition (i.e., those who received no NF messages) appeared to drink a greater number of drinks per week (M=10.3, SD=1.4) than did men in the behavioural NF condition (M=6.9, SD=1.5) or men in the attitudinal NF condition (M=4.3, SD=2.1) during a typical week post-intervention.

Second, there was a significant interaction effect between experimental condition and sex of the recipient, on the typical number of drinking days per week at follow-up ($F(2,107)=4.089$, $p=.019$). For this interaction, *Levene's statistic* was not significant ($p>.05$), thus ln transformations were not undertaken. The results suggest that the effect

of the condition on drinking frequency differed for males and females in the study. Figure 3 presents a bar graph that helps to explain the nature of this interaction effect.

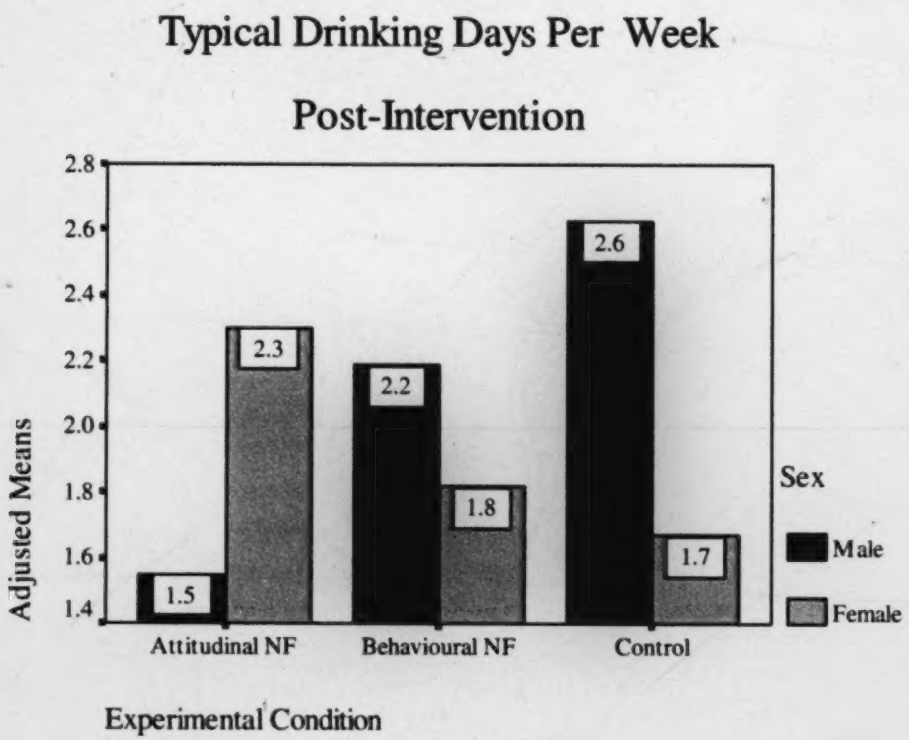

Figure 3. Follow-up Drinking Days Per Week, By Sex and Experimental Condition

Figure 3 shows that for women, experimental condition had minimal effect on weekly drinking frequency; in fact, it appears that women in the control condition (i.e., those who received no feedback) drank less often at follow-up than did those in the feedback conditions. For men, however, those in the control condition reported a significantly greater number of drinking days per week (M=2.6, SD=0.3) than those in the behavioural NF condition (M=2.2, SD=0.3) or the attitudinal NF condition (M=1.5, SD=0.4).

The second set of analyses revealed only non-significant interaction effects ($p>.05$) on each of the five dependent variables. These results indicate that the effect of the intervention on follow-up alcohol use measures did not differ by problem drinking status.

Evidence of Normative Perception Change at Follow-up

Given that the NF intervention designed for this study appeared largely unsuccessful at promoting behaviour change, further analyses were conducted to examine differences in normative perception at baseline and follow-up. Other NF campaigns, particularly those focusing not on individual drinkers but on populations of a larger scope, have shown that NF can facilitate the adoption of more accurate perceptions of student drinking without demonstrable behaviour change (e.g., Barnett et al., 1996).

ANCOVA could not be used to assess pre- and post-intervention differences in normative perception; preliminary analyses showed that the homogeneity-of-slopes assumption was significant for each of the six normative perception items. Instead, sex-specific difference scores were calculated by subtracting baseline estimates from follow-up estimates, and one-way ANOVAs were used to detect statistical significance in difference scores. A similar procedure was used by Walters, Bennett, and Miller (2000) when evaluating the effectiveness of a personalized NF intervention.

Only one item, in which males in the sample (n=39) were asked to estimate the extent to which other male students agreed that "*it is important to show how much you can drink and still hold your alcohol*," emerged as statistically significant, ($F(2,37)=3.354$, $p=.046$). Those in the attitudinal NF condition (i.e., those who were informed of the actual norm for this item) had the largest difference score ($M=-15.3$,

SD=26.7), whereas those in the behavioural NF and control conditions (i.e., those who were not informed of the actual norm for this item), had difference scores of -2.1 (SD=21.8) and +11.4 (SD=26.2), respectively. Difference scores for this item were not statistically different at baseline and follow-up for females in the sample, nor were differences detected for the other five normative perception items, for participants of either sex.

Main Analyses: Study 2

Recall that the primary goal of *Study 2* was to qualitatively explore how students responded to NF. This was done using one open-ended question, allowing participants to articulate their immediate reactions to the NF information they received, and a number of items designed to measure believability of NF. It was anticipated that a deeper understanding of students' reactions to NF might guide the interpretation *Study 1* results.

Immediate Reaction to NF

First, all students assigned to the attitudinal NF condition (n=33) and those assigned to the behavioural NF condition (n=34) were asked to respond to an open-ended question after the feedback messages were displayed on their monitors. The question asked participants to describe their reactions to the information presented on the previous page. It instructed them to *use sentences or words (point form) to describe how you feel (e.g., surprised, doubtful, don't care)*, and to attempt to explain their feelings.

In order to analyze the data gathered using the open-ended question, several steps were taken (Pope, Ziebland, & Mays, 2000). First, the data were read and re-read to develop an overview of the range of responses gathered. Second, summarizing word(s) or phrase(s) were created to describe each individual response. Third, responses with

shared or similar word(s) or phrases(s) were grouped together into categories, and responses that fit each category were put together to display the range of participants' reactions. Given that the results of *Study 1* showed that men and women reacted differently to NF, responses were examined separately by sex, where (M) was used to denote reactions of male students, while (F) was used to denote reactions of female students.

The following four categories were used to group participants' reactions to receipt of attitudinal NF: (i) surprise – attitudinal norms seen as conservative; (ii) surprise – attitudinal norms seen as liberal; (iii) positive reaction; (iv) doubt accuracy of feedback. Based on previous research in this area (e.g., Granfield, 2002; Nye et al., 1999), other categories were also considered (e.g., negative affect, problem recognition, and denial of feedback accuracy), but they did not fit the response data.

Of the 33 students randomly assigned to receive attitudinal NF, 10 (n=3 males, n=7 females) did not provide a response to the open-ended question. A further 2 participants (n=2 females) provided a response of *surprised*, however, no further impressions or sentiments were articulated, and it was not possible to find meaning in these responses. It is also interesting to note that 4 participants (n=2 males, n=2 females) simply stated that they were *not surprised*. Again, without elaboration, it was not possible to find meaning in these responses. In total, 21 students' reactions to attitudinal NF were analyzed. Table 9 outlines these reactions by category. Note that some participants' reactions are displayed in more than one category.

Table 9

Participants' Reaction to Attitudinal NF (n=21)

Category	Response
Surprise – attitudinal norms seen as conservative	Surprised, exact opposite of what I thought (M)
	Surprised. I thought university was comprised entirely of unthinking America-hogs (jocks)...(M)
	I was surprised it was so low...(M)
	I was surprised at how off I was with the percentages. I thought that people viewed drinking as an important part of University, more so in residence, which is where I live. (F)
	Very low...I was surprised by it. (F)
	I was surprised by the first answer. I thought more people would have considered drinking essential...(F)
	Surprised, I expected some of the numbers to be higher (F)
	Was surprised about how low the number of people who said drinking was not an important part of the university experience. I would have thought it would be higher based on the girls I know. (F)
	The percentages are actually less that [than] I thought they would be (F)
Surprise – attitudinal norms seen as liberal	A little surprised that 11% of women think that drinking is necessary for the college experience (F)
	I was surprised so many females thought it was important that they could hold their liquor. I didn't think barely any female would care about that. (F)
	A little surprised that the stats are as high as they are...(F)
	I am surprised the number is larger than I thought. (F)
	I was surprised at how many females think you have to drink to make it socially (F)

Positive reaction	Maybe there's hope for humanity. (M)
	Very interesting (F)
Doubt accuracy of feedback	I wonder where that data was collected (M)
	I am not surprised but I feel that alot (sic) of the people I know would answer the questions quite differently than I or than the previous people have answered the survey. (F)

Table 9 shows that the large majority of participants (n=14) who received attitudinal NF expressed an element of surprise after reading the actual norms. It is important to note that the instructions for completing the open-ended question made specific reference to surprise as an example of the type of reaction that might be experienced. One consequence of phrasing the question in this way may have been to prompt respondents to frame their response according to level of surprise, perhaps eliciting a greater number of responses in the *surprised* categories than might otherwise be expected. As anticipated, however, most participants (n=9) were surprised at how conservative the actual norms were. Unexpectedly, five participants indicated that they were surprised at how liberal the actual norms were. All five were female; this may offer some explanation for why the attitudinal NF did not appear to have any effect on follow-up drinking behaviour for female recipients. Presumably, the effect of the intervention was negligible for these five participants, all of whom underestimated social norms for alcohol use prior at baseline.

Two additional responses were categorized as *positive reaction*; one student expressed interest in the feedback, the other expressed hope at having learned of the actual norms. Finally, two respondents expressed doubt at the accuracy of the feedback, both making reference to the proximity of the referent group. A review of social norms research conducted by Borsari and Carey (2003) indicates that normative information is most meaningful to students when a close referent group is used (e.g., "friends" or "students in this residence"), as opposed to a more distal group (e.g., "university students in Alberta"), as was used in this research.

The following five categories were used to group participants' reactions to receipt of behavioural NF: (i) surprise – behavioural norms seen as low; (ii) surprise – behavioural norms seen as high; (iii) positive reaction; (iv) don't care; (v) doubt accuracy of feedback. Again, based on previous research in NF interventions, other response categories were considered (i.e., negative affect, problem recognition, and denial of feedback accuracy), but not included because they did not fit the response data.

Of the 34 students randomly assigned to receive behavioural NF, 4 (n=3 males, n=1 females) did not provide a response to the open-ended question. A further 2 respondents (n=2 females) provided a response of *surprised*, and 4 respondents (n=1 male, n=3 females) provided a response of *not surprised.* However, because no further impressions or sentiments were articulated, these impressions could not be interpreted. In total, 28 students' responses were analyzed, and are presented by category in Table 10. Note that some participants' reactions are displayed in more than one category.

Table 10

Participants' Reactions to Behavioural NF (n=28)

Category	Response
Surprised-norms were lower than expected	I am surprised by the results...I expected it to be higher. (M)
	Personally I am surprised, for I have found that many students feel the need to go out every weekend and have a few drinks just to "enjoy" life. (M)
	Surprised by how many people don't drink (M)
	A bit surprised that people don't drink as much as I thought they did. (M)
	Surprised. I enjoy drinking usually twice a month. This is considered low in my circle of friends. (M)
	I was surprised because that means my friends are I are above average drinkers. (M)
	I am very surprised...I believe it would be higher (F)
	I was a little surprised that females only have about 4.4 drinks per week. I always thought it was the thing to do, to go and drink at the bar until you were so drunk you could barely walk by the end of the night! (F)
	Really surprised. Thought it was higher. (F)
	Surprising, I did believe that drinking plays a significant role in alot [sic] of students lives (F)
	...I was surprised to see the numbers lower than I had guessed. (F)
	I thought there would be more "binge drinking" episodes than 1 per month. (F)
Surprised-norms were higher than expected	I cannot believe so many students drink, even though the quantity consumed was lower, the number of drinkers was higher. I'm surprised. (F)

	Surprised people drank that much…it's expensive (F)
	It was pretty much what I had thought…I think it is still high for numbers though (F)
	Surprised, people seem to drink more often than I would have supposed. (F)
	Surprised to see that the percentage was that low for people who dont [sic] use alcohol (F)
Positive reaction	I am pleased that I over shot. I respect people who don't drink, and people who only drink to a certain extent…the numbers are more positive than negative in my opinion. (M)
	I found it interesting. (M)
	I feel the information on the previous page may be true because people tend to overestimate how much others do something compared to them. It's just because nobody wants to feel like they are the only ones doing something "wrong" and if I'm drinking that much I'll probably assume a lot of others are drinking that much. (F)
	I thought I was shooting low for my estimates but am happy to know that there are others out there like me who don't care so much about drinking. Sometimes it seems like drinking is all anyone ever does in university! (F)
Don't care	Don't care (M)
	Believable, but I do not feel guilty of my drinking habits. I like to have a good time, and as long as no problems arise I will continue to do so. (F)

Doubt accuracy of feedback	Would say the information is misleading, because these numbers are averages of all male students who drink, but the average male students who actually drink that I know usually have a lot more to drink than the statistics represented…(M)
	I think that maybe the statistics may be wrong due to people being weary about telling the truth in fear of others finding out about their habits. (M)
	…Perhaps they failed to distinguish the difference in alcohol level in a 'single drink.' Also, perhaps some who drink a lot are downplaying the amount they drink. (M)

Table 10 shows that the large majority of students who received behavioural NF (n=17) also expressed some degree of surprise after learning of the actual norms. Again, this result might be attributed in part to the phrasing of the open-ended question. While most participants (n=12) were surprised at how low the actual drinking quantities/ frequencies were, five females indicated that they had underestimated the behavioural norms at baseline, and were surprised at how high the actual feedback numbers were. Again, this presents a possible explanation for why women reacted differently to the feedback than did men; these five women felt that the NF indicated that alcohol use was high among their peers. Interestingly, none of the men appeared to have interpreted the NF in this way.

It is also important to note that two of the five women who expressed surprise in the unanticipated direction (i.e., indicating that actual behavioural norms were higher than perceived) were writing in reference to quantity of drinkers versus non-drinkers on campus. These women felt that the percentage of non-drinkers on campus was low; these comments were reflective of the perceived norm revealed in this research for the first behavioural item. Recall that women in this study estimated the percentage of same-sex non-drinkers to be 23.7%, while the actual trend is considerably lower (14.7%).

Four students who received behavioural NF made comments that were categorized as *positive reaction*. One student in particular indicated that she was pleased to know that she was not isolated in feeling that drinking does not have to be a central part of the university lifestyle (e.g., "...am happy to know that there are others like me who don't care so much about drinking. Sometimes it seems like drinking is all anyone ever does in university"). Although this comment was made in response to behavioural

NF, it is in line with findings from an attitudinal NF study reported by Prentice and Miller (1993). The authors found that many students who mistakenly believed that their attitudes were discrepant from those of other students showed signs of alienation from the study body and the larger university community.

Two students' reactions indicated that the NF they had just received did not motivate them to change their drinking behaviour (i.e., those categorized as *don't care*). Finally, three students responded to the open-ended question by pointing out reasons for why they doubted the feedback provided was accurate. Again, one made reference to proximity of the referent group. The remaining two suggested that social desirability influenced respondents to the CCS, encouraging them to falsely report their actual drinking behaviours. While this is a flaw inherent to any research that relies on self-report data, further probing of these responses- although impossible at the time of data collection- might have revealed that these three students were in fact resistant to accept that their drinking habits were discrepant from the norm.

Finally, although their comments are not presented in Table 10, three students who received behavioural NF expressed thoughts on why their normative estimates had been inaccurate at baseline. Each referred to a different source of normative research, all of which have been previously documented in social norms theory: "I based my answers on what I saw in high school" (observation), "probably the media puts these ideas in peoples [sic] heads" (media), and "I guess people just brag about [heavy drinking] when they have done it" (social conversation).

Believability of NF

Once all students in the NF intervention conditions had been provided with the opportunity to respond to the open-ended question, three seven-point Likhert scale items were presented. These items were used to evaluate whether participants believed the NF they received to be from a credible source, were skeptical of it, and/or were motivated to change their drinking behaviour as a result of having seen it.

Skepticism and credibility were considered important to measure in this research, particularly given that the mode of intervention delivery was electronic, and the believability of online information in this context has not yet been assessed. With regard to the believability of print-based NF messaging, previous research in student responsiveness has provided conflicting results (see Glider et al., 2001 vs. Granfield, 2002). Results of the current study show that with regards to credibility, the mean response to the item *how credible is the information you just read?* was 4.9 (SD=1.2) for students in the attitudinal NF condition, and 4.7 (SD=1.0) for those in the behavioural NF condition. In fact, the lowest rating for credibility was 3.0 for the attitudinal NF group and 2.0 for the behavioural NF group. With regards to skepticism, the mean response to the item *how skeptical are you of the information you just read?* was 3.3 (SD=1.7) for students in the attitudinal condition, and 3.7 (SD=1.5) for those in the behavioural condition. Collectively, these results suggest that participants in the NF conditions generally believed the information they received to be from a credible source, and were not highly skeptical of its contents. Despite these seemingly positive results, participants indicated that the information received would not likely motivate them to change their drinking habits; students in the attitudinal NF condition had a mean motivation to change

score of 1.8 (SD=1.1), and those in the behavioural NF condition had a similar score (M=1.6, SD=1.4).

CHAPTER FIVE

Discussion

Results of this study show that the electronic personalized NF intervention had little impact on changing drinking patterns or reducing alcohol-related problems among students attending the University of Alberta. This finding is contrary to other research involving the mail-based delivery of personalized NF, which has been relatively successful in encouraging behavioural modification (e.g., Agostinelli et al., 1995; Walters, 2000; Walters, Bennett, & Miller, 2000; Collins et al., 2002; Neal & Carey, 2004). However, the results of other non-personalized social norms interventions, including media campaigns and lecture or discussion-based groups, are equivocal at best. Werch et al. (2000) suggest that the results of any successful NF interventions should be interpreted with caution, given that many past studies were flawed by a range of methodological weaknesses. The present research eliminated many such flaws, for example, by avoiding convenience sampling, using random assignment into intervention groups, employing a no-treatment control group, and including both problem and non-problem drinkers in the study.

Study 1

This study drew theoretical inspiration from promising research which indicates that when presented with actual norms for peer alcohol use, most students will revise their exaggerated perceptions, and ultimately their drinking practices, downward. In order for this theory to hold true, false perceptions about collective alcohol-related attitudes and consumption norms must be evident in the student population; recall that a secondary goal of this study was to determine the extent of normative misperceptions in

the present sample. Consistent with past research, the results of this study documented a difference between perceptions of typical student drinking and self-reported drinking behaviour, with regard to both attitudes (i.e., the importance of drinking in university, the importance of showing how much you can drink, the role of alcohol in social life) and behaviours (i.e., weekly drinking quantity, monthly heavy episodic drinking frequency). However, students in this sample tended to overestimate the number of non-drinkers in their campus community, a finding which had not been anticipated. This may be due to a definition of "current drinker" that is not shared between the research community and university students (i.e., while a non-drinker is traditionally defined as someone who has not consumed alcohol in the past year, students may not distinguish between those who had no alcohol in the previous year and those who rarely had alcohol during this time). Thus, while research has been done to understand the ways that students themselves define binge drinking (Wechsler & Kuo, 2000), the same approach should be considered in order to better understand the ways that students define non-drinking.

The lack of homogeneity in the normative discrepancy items used in this study also points to the need to conduct further research into the specific normative items for which discrepancy is greatest, and ultimately, for which behaviour change is greatest once intervention has taken place. There is a notable absence of an established measure for evaluating perceived alcohol-related norms both pre-and post-intervention; this limits the capacity of the research community to systematically evaluate normative misperceptions, and to reliably determine the effectiveness of interventions similar to the present one.

The major focus of *Study 1* was to determine the impact of a simple electronic NF intervention in promoting behaviour change among student drinkers at the University of Alberta. Specifically, the study contrasted the impact of attitudinal NF (i.e., messages focused on peer approval for alcohol use), behavioural NF (i.e., messages focused on peer consumption norms), and no feedback of any kind.

Of the five behavioural outcomes used to measure follow-up drinking differences between intervention groups, four made reference to consumption levels. Although none achieved statistical significance at $p<.05$, close inspection of the mean pre- and post-intervention scores for these variables shows that exposure to both the attitudinal NF and behavioural NF produced lower mean scores at follow-up in each of these four outcome variables. There was also some unexplained downwards movement from pre- to post-intervention in the control group, but overall, the results suggest a slight favouring of the intervention groups in promoting behaviour change.

That said, it is clear that the NF interventions for this research did not bring about widespread change in the drinking behaviours of its participants. The intervention also appeared to have no effect on the experience of alcohol-related consequences. Arguably, this finding is not all that surprising, given that the NF messages used in this intervention did not speak directly to the issue of alcohol-related consequences. However, some researchers have been able to show an effect of NF interventions on problem reduction, most notably Baer et al. (2001), whose combined discussion group – NF counselling sessions have reduced alcohol-related consequences over a multi-year follow-up period. If the present study were to be replicated, it is suggested that the SIP-2R be administered; it uses the same items as the SIP-2L, but offers a more appropriate time-frame for student

drinking (i.e., past month) than does the SIP-2L. Also, it is recommended that one or more of the behavioural NF messages included in the intervention make specific reference to peers' experience of alcohol-related consequences. This may increase the likelihood of NF succeeding as an effective harm reduction tool.

Despite a lack of evidence for the effectiveness of either NF intervention, interestingly, sex by condition interaction effects were revealed for two outcome variables related to personal alcohol consumption (i.e., weekly drinking quantity and weekly drinking frequency). This suggests that male and female students responded to the interventions differently, a finding that does not bode well for the generalizability of the intervention to the larger student body. Further research must be conducted to determine the extent to which these interactions hold true, particularly using a sex-specific measure of heavy episodic drinking. However, the interaction effects revealed point to the need to better understand the different meanings of alcohol use in the social lives of male and female university students, and to further examine the effect of sex on drinking behaviour, particularly in the context of developing social norms interventions. For example, Peeler et al. (2000) also noted an effect of sex in their intervention study, and suggested that NF interventions may be subject to a 'floor effect.' That is, because men have higher alcohol consumption rates than do women, their behaviour is more likely to be affected by NF interventions because greater drinking reductions are possible.

The present study did not reveal an effect of problem drinking status and condition. This is a promising result with regards to generalizability of the intervention. The large majority of existing NF studies have focused uniquely on heavy and/or problem drinkers; in fact, Agostinelli et al. (1995) have cautioned against 'blanketing' the

student population with normative information out of concern that the intervention might actually increase alcohol use among light or occasional drinkers. The results of this study, however, suggest that problem drinkers and non-problem drinkers responded to the NF intervention in a similar manner.

Study 2

The second study was largely exploratory in nature. Its intent was to make a preliminary attempt to address calls in the research for further study into the ways in which NF is received, interpreted, and responded to by students. Overall, most participants articulated a reaction to the presented information that could be classified as surprised (e.g., "...people don't drink as much as I thought they did") or positive (e.g., "...am happy to know that there are others out there like me who don't care so much about drinking"). Interestingly, many of the response categories used in Nye et al. (1999) did not fit the responses gathered in the current study. This may reflect the fact that Nye et al. (1999) used a sample of heavy drinkers, whereas this study used a general student sample. This may also reflect different methods of data collection; students in the first study voiced their reactions into a tape-recorder, and may have done so with greater detail or depth. Students in this study generally voiced their reactions in a brief one-line written response.

Interestingly, students' reactions gathered in this phase of the research aid in the interpretation of results of *Study 1*. Women in this study appeared better able than men to estimate sex-specific peer norms with reasonable accuracy. In fact, some women in this study expressed surprise at how liberal actual attitudinal norms were, or at how high actual behavioural norms were. In contrast, men expressed surprise in the anticipated

directions (i.e., that attitudinal norms were more conservative than expected, and that behavioural norms were lower than expected). These reactions may explain why the NF interventions appear to have affected men's, but not women's, follow-up drinking behaviour. Further study is required in this area, given that reactions gathered in *Study 2* were those of only a small number of students of either sex.

In the current study, very few participants (n=5) doubted the validity of the NF, and although a few students indicated that they "didn't care" about the feedback they had received, no comments were classified as defensive. These findings were supported by the mean ratings of message credibility, which were well above the mid-point (3.5) for both conditions, and the mean ratings of skepticism, which were at the mid-point (3.5) for both conditions. These results are in line with positive reactions to NF reported by Collins et al. (2002) and Glider et al. (2001), and run counter to those reported by Granfield (2002), who suggested that many students believed normative messages to be a "public relations ploy hatched by [university] administrators" (p. 26). It appears that the CCS data was perceived as coming from a reputable source, and did not provoke much resistance from students in the study sample. Replication of this study using future CCS data may also increase the legitimacy of the intervention, as current information may be more readily acceptable to the young adult audience. It also remains unclear whether ratings of message credibility and skepticism were influenced by e-delivery, not simply by the source of the information (i.e., the 1998 CCS). In a review of internet-based information on alcohol, tobacco, and other drugs, a number of data quality issues emerged (e.g., citation of original sources, accuracy of site content, users' past experience with misleading web-based information). Thus, it would be valuable to replicate this

study with the goal of contrasting mode of delivery, electronic or otherwise. One notable disadvantage to e-delivery of NF is that it is impossible to know the extent to which students choose to keep a hard copy of the data (i.e., by printing it from their monitors). NF that is mailed might be more likely to be read and/or kept for a greater length of time, thereby providing 'boosters' or 'reminders' of actual campus norms. Also, the website in this study, although aesthetically pleasing, did not use sophisticated features (e.g., graphics or bright colours). This may have affected participants' level of interest in the site, because the visual appearance of a website is a criterion for evaluating health-related electronic media (Doshi, Patrick, Sallis, & Calfras, 2003).

Despite promising findings related to the believability of both attitudinal and behavioural normative data, students were not likely to report that the information they had received would evoke change in their drinking practices. This is an important finding; Dowdall and Wechsler (2002) have argued that there is a considerable gap between the university population and the academic community who seek to change their drinking practices. The results of *Study 2* would seem to indicate that the failure of NF interventions to bring about change in drinking practices cannot simply be attributed to lack of believability of NF information. Instead, merely presenting believable norms may not be sufficient to motivate behaviour change.

There are a number of other potential research avenues heightened by the preliminary findings of *Study 2*. Future research might investigate the different ways that students react to normative information by drinking status. The present study sought only to display the range of student reactions to NF and did not distinguish reaction type by level of alcohol typically consumed. Presumably, the heaviest drinkers in the

university population (i.e., those with the greatest discrepancy between personal drinking practices and the campus norm), are those most likely to react negatively (e.g., with denial, defensiveness, or anger) to NF. Research could also be conducted to evaluate the impact of providing NF that clearly states that a heavy drinker's alcohol use is problematic, given that most normative information, like that which was used for the purposes of this study, offers no blatant suggestion of problem drinking.

Limitations

Limitations of this study include: (i) attrition of problem drinkers, (ii) reliance on self-reported alcohol use data, (iii) lack of sex sensitivity in binge drinking measures, (iv) use of a short follow-up period, (v) small sample size, and (vi) competing sources of NF. These limitations are common to many treatment/ no treatment study designs in alcohol intervention research.

First, problem drinkers recruited at baseline were more likely than non-problem drinkers to be lost to follow-up, and it is unclear whether other problem and/or heavy drinkers may have chosen not to participate in the study after learning of its purpose. The online data collection tool did not record the number of students who accessed the study website, but exited the survey without submitting their answers.

Second, this study relied on self-reported alcohol use data for both pre- and post-intervention data collection. Concerns about the reliability of self-reported data include both unintentional response bias (e.g., unreliable recall) and intentional response bias (e.g., the tendency of participants to adjust their reported behaviour to give a socially desirable answer, or answer that reflects the intended outcome of the study). However,

self-report data has been documented as a reasonably valid measure of alcohol use among problem drinkers (Cooper, Sobell, Sobell, & Maisto, 1981) as well as young adults (Midanik, 1998), and rates of alcohol use obtained in this study closely correspond to those documented in the 1998 CCS. It should be noted, however, that new findings suggest that many students overestimate the volume of a standard drink, and as such, may consume significantly more alcohol than is noted by self-report (White, Kraus, McCracken, & Swartzelder, 2003).

Third, this study did not use a sex-sensitive criterion for binge drinking. As was done in the CCS, both men and women were examined using the traditional definition of five or more drinks in a single occasion. However, in recent years, the use of sex-specific measures (i.e., 4 or more drinks in a row for women, 5 or more drinks in a row for men) has become more common. Should this study be replicated, a sex-specific measure is recommended.

Fourth, this study used a relatively short follow-up period (i.e., six weeks post-intervention). Although this time period is in line with previous studies of social norms interventions (e.g., Collins et al., 2002; Walters & Bennett, 2000; Walters, 2000; Werch et al., 2000), it limits the ability to determine whether the interaction effects revealed in this study would endure over a longer period of time. However, a review of interventions for problem drinking has shown that the effects of other brief interventions have lasted over a period of one to five years (Bien, Miller, & Tonigan, 1993).

Fifth, this study employed a small sample size, drawn from only one Alberta university. A number of technical difficulties prevented the sample size from being larger; there is evidence that 157 invited participants to the study were unable to complete

baseline measures, despite having accessed the study website. The RCT sample (n=114) was smaller than the required sample size determined by power calculations (n=135). This limited the ability to detect differences between groups in *Study 1*, and the ability to run exploratory tests on the data (e.g., interaction effects of sex, condition, and problem drinking status). The small sample size also restricts the extent to which the results of this study can be generalized to the larger university student population.

Finally, as in all field research studies, this research could not control for sources of influence in the larger environment. Thus, other sources of normative information (false or otherwise, e.g., media, observed behaviour, social conversation) could not be controlled for, and must be recognized as information sources that may have competed with the information provided to students in the NF conditions. Although heavy drinking is not the norm among university students in Alberta, it may have been highly visible to some study participants, and assumed to be the norm, despite evidence to the contrary. The baseline data collection tool did attempt to gather data on the number of students who had already participated in alcohol-related research in the previous three months, however, due to a technical error, this information was not properly stored, and could not be analyzed. Nonetheless, the researcher was not aware of any social marketing campaigns or other personalized NF interventions taking place at the University of Alberta at the time of data collection and intervention.

Conclusion

Collectively, the results of this research suggest that there is no 'one size fits all' intervention that can be designed to reduce the harms associated with heavy alcohol use. This two-part study found that although normative misperceptions were revealed in a sample of undergraduate university students, and despite a generally positive reaction to an online intervention communicating actual attitudinal or behavioural norms, most students' drinking patterns did not show movement in the anticipated (i.e., more conservative) direction at follow-up. Interaction effects (sex x condition) suggested that males and females responded to the NF intervention messages differently, however, and that men in the intervention conditions, particularly those exposed to attitudinal NF, were more likely to report reductions in weekly drinking quantity and frequency.

The results of this study do not encourage widespread use of such an electronic NF intervention as the sole component of a campus alcohol risk-reduction strategy. However, there may remain a role for it in conjunction with multi-level health promotion strategies (i.e., those involving environmental and political change), particularly given that NF is believable to university students. However, further research is required to better understand the role of sex in determining the effectiveness of NF interventions. It appears that qualitative open-ended questions, designed to help better understand students' reactions to NF, can help to explain sex-specific differences in post-intervention drinking behaviour. Further, intention to change measures can help to better understand the role of NF in encouraging reductions in personal drinking. Alcohol research should continue to complement quantitative methods with qualitative methods, particularly with regard to NF intervention studies.

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Appendix A: Electronic Invitation to Complete the Baseline Assessment

You have been randomly selected to participate in a study on campus alcohol use. We have asked 900 U of A students to take part. Participation is voluntary.

If you complete the study, you will have a chance to win one $200 gift certificate. The information you provide will be held confidential.

Interested? Please go to www.atl.ualberta.ca/alcoholsurvey and enter password at the end of this message. You will then be given more information about the study.

Your password is:

Appendix B: "Reminder" Electronic Invitation to Complete the Baseline Assessment

A few days ago, you were sent an e-mail saying that you were randomly selected to participate in a study on campus alcohol use. We have asked 900 U of A students to take part. Participation is voluntary, however, we encourage you to take part. In doing so, you would be helping to provide us with the most accurate picture of alcohol use at the U of A.

By completing the study, you will have a chance to win one $200 gift certificate. The information you provide will be held confidential.

Please go to www.atl.ualberta.ca/alcoholsurvey and enter password at the end of this message. You will then be given more information about the study.

Your password is:

Appendix C: Second Electronic Invitation Distributed to Students Unable to Complete the Baseline Assessment Between February 10 and February 12, 2004

A few days ago, you completed an online study on campus alcohol use. Unfortunately, due to technical difficulties, the information that you provided was not recorded.

We would like to thank you very much for helping us with our study. We would also like you to complete the survey again, now that our technical difficulties have been resolved. Your participation allows us to determine an accurate picture of alcohol use at the U of A.

Remember, all information that you provide will be held confidential. By completing the study, you will have a chance to win one $200 gift certificate.

Please go to www.atl.ualberta.ca/alcoholsurvey and enter password at the end of this message. You will then be able to proceed with the survey.

Thank you for your help.

Your password is:

Appendix F: Baseline Assessment Instrument

PART A: ABOUT YOU

1. What is your gender? [Radio buttons]
male
female

2. What is your age in years? [Drop box]
17 or under
18
19
20
21
22
23
24
25
26 or over

3. What is your year of study? [Drop box]
1st year undergraduate
2nd year undergraduate
3rd year undergraduate
4th year undergraduate
1st year graduate/doctoral
2nd year graduate/doctoral
3rd year graduate/doctoral
4th year graduate/doctoral
other (check)

5. What is your student status? [Drop box]
full-time (on campus)
full-time (distance)
part-time (on campus)
part-time (distance)

6. What is your living arrangement? [Radio buttons]
live alone
live with friends/roommates
live with parents
live with spouse
live with children
other

7. In which type of accommodation do you live? [Drop box]

house/apartment
campus residence
fraternity/sorority house
other (check)

[Button: Next]

PART B: YOUR DRINKING PROFILE

The following questions ask about your drinking patterns in a number of different ways.

For these questions, **one drink is equal** to: 12 oz (341 mL) beer
5 oz (142 mL) wine
1.5 oz (43 mL) spirits

7. Have you had any alcohol in the past 12 months? [Radio buttons]
Yes
No

If you answered "no" to #7, go to the bottom of the page and press *next* .
If you answered "yes" to #7, continue on this page.

8. Think about the past month. Please fill in a rough estimate of the number of drinks you usually consumed on each day of the week.

	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
Number of drinks							

9. In the past month, how many times did you consume **4 or more drinks** on a single occasion?
[Box]

10. In the past month, how many times did you consume **5 or more drinks** on a single occasion?
[Box]

11. In the past month, what is the maximum number of drinks you consumed in a single occasion?

I consumed [Box] drinks in [Box] hours.

[Button: Next]

PART C: CAMPUS NORMS

Remember, **one drink is equal to**:

12 oz (341 mL) beer
5 oz (142 mL) wine
1.5 oz (43 mL) spirits

Think about MALE/FEMALE students attending universities across Alberta, then:

12. Estimate the percentage of MALE/FEMALE students who **do not** use alcohol.
Your guess: [Box] % of students.

13. Estimate the average **number of drinks** consumed in a **week** by MALE/FEMALE students who drink.
Your guess: [Box] drink(s).

14. Estimate the average **number of times in a month** MALE/FEMALE students who drink have **5 or more drinks on a single occasion**.
Your guess: [Box] time(s).

15. Estimate the percentage of MALE/FEMALE students who agree with the statement "***drinking is an important part of the university experience.***"
Your guess: [Box] % of students.

16. Estimate the percentage of MALE/FEMALE students who agree with the statement "*it is important to show how much you can drink and still hold your liquor.*"
Your guess: [Box] % of students.

17. Estimate the percentage of MALE/FEMALE students who agree with the statement "*you can't make it socially at this university without drinking.*"
Your guess: [Box] % of students.

18. To what extent do **you** approve or disapprove of the drinking habits of university students? [Radio buttons]
1 (I completely disapprove)
2
3
4
5
6
7
8
9
10 (I completely approve)

19. To what extent to you think that **other university students** approve or disapprove of their own drinking habits? [Radio buttons]
1 (They completely disapprove)
2
3
4
5
6
7
8
9
10 (They completely approve)

[Button: Next]

PART D: ALCOHOL-RELATED CONSEQUENCES

Here are a number of events that people sometimes experience. Indicate whether any of these things have happened to you in the past month: [Radio buttons]

20. I have been unhappy because of my drinking.
Yes No

21. Because of my drinking, I have not eaten properly.
Yes No

22. I have failed to do what is expected of me because of my drinking.
Yes No

23. I have felt guilty or ashamed because of my drinking.
Yes No

24. I have taken foolish risks when I have been drinking.
Yes No

25. When drinking, I have done impulsive things that I regretted later.
Yes No

26. My physical health has been harmed by my drinking.
Yes No

27. I have had money problems because of my drinking.
Yes No

28. My physical appearance has been harmed by my drinking.
Yes No

29. My family has been hurt by my drinking.
Yes No

30. A friendship or close relationship has been damaged by my drinking.
Yes No

31. My drinking has gotten in the way of my growth as a person.
Yes No

32. My drinking has damaged my social life, popularity, or reputation.
Yes No

33. I have spent too much or lost a lot of money because of my drinking.
Yes No

34. I have had an accident while drinking or intoxicated.
Yes No

PART E: MORE ABOUT YOUR DRINKING

35. How often do you have a drink containing alcohol?

0	1	2	3	4
Never	Monthly or less	2-4 times a month	2-3 times a week	4+ times a week

36. How many drinks containing alcohol do you have on a typical day when you are drinking?

0	1	2	3	4
1 or 2	3 or 4	5 or 6	7 to 9	10 or more

37. How often do you have six drinks or more on one occasion?

0	1	2	3	4
Never	Less than monthly	Monthly	Weekly	Daily/Almost

38. How often during the last year have you found that you were not able to stop drinking once you had started?

0	1	2	3	4
Never	Less than monthly	Monthly	Weekly	Daily/Almost

39. How often during the last year have you failed to do what was normally expected of you because of drinking?

0	1	2	3	4
Never	Less than monthly	Monthly	Weekly	Daily/Almost

40. How often during the last year have you needed a first drink in the morning to get yourself going after a heavy drinking session?

0	1	2	3	4
Never	Less than monthly	Monthly	Weekly	Daily/Almost

41. How often during the last year have you had a feeling of guilt or remorse after drinking?

0	1	2	3	4
Never	Less than monthly	Monthly	Weekly	Daily/Almost

42. How often during the last year have you been unable to remember what happened the night before you had been drinking?

0	1	2	3	4
Never	Less than monthly	Monthly	Weekly	Daily/Almost

43. Have you or someone else been injured as a result of your drinking?

0	1	2
No	Yes, but not in the last year	Yes, during the last year

44. Has a relative, friend, doctor, or other health worker been concerned about your drinking or suggested that you should cut down?

0	1	2
No	Yes, but not in the last year	Yes, during the last year

45. Have you completed any other online surveys about alcohol use in the past three months?

Yes No

[Button: Submit]

Appendix G: Attitudinal Normative Feedback

How do you compare to other university students?

Recently, **over 900 randomly selected undergraduate university students in Alberta** were surveyed about their attitudes toward alcohol use (Gliksman et al., 2000).

You were asked to think about male/female students, then:

Estimate the percentage of students who agreed with the statement "drinking is an important part of the university experience."

You said:	The actual number from the survey was:
____%	MALE: 28.9%
	FEMALE: 23.1%

Estimate the percentage of students who agreed with the statement "it is important to show how much you can drink and still hold your liquor."

You said:	The actual number from the survey was:
____%	MALE: 18.8%
	FEMALE: 16.7%

Estimate the percentage of students who agreed with the statement "you can't make it socially at this university without drinking."

You said:	The actual number from the survey was:
____%	MALE: 10.6%
	FEMALE: 11.5%

[Button: Next]

Appendix H: Behavioural Normative Feedback

How do you compare to other university students?

Recently, **over 900 randomly selected undergraduate university students in Alberta** were surveyed about their drinking patterns in the past twelve months (Gliksman et al., 2000).

You were asked to think about male/female students, then:

Estimate the percentage of students who reported not using alcohol.

You said:	The actual number from the survey was:
____%	MALE: 15.8%
	FEMALE: 14.7%

Estimate the average number of drinks consumed in a week by those students who drink.

You said:	The actual number from the survey was:
____ drinks per week	MALE: 5.6 drinks per week
	FEMALE: 4.4 drinks per week

Estimate the average number of times in a month students who drink had 5 or more drinks in a single occasion.

You said:	The actual number from the survey was:
____ time(s) per month.	MALE: almost 2 times per month
	FEMALE: about 1 time per month

[Button: Next]

Appendix I: Concluding Message for Baseline Survey

Thank you for completing this survey! In six weeks, you will be sent an e-mail inviting you to complete the follow up survey.

If you have questions or concerns related to alcohol use, you may contact the *University Peer Health Educators* on campus (492-2612; www.ualberta.ca/HEALTHINFO/peered.htm). You may also contact the *Alberta Alcohol and Drug Abuse Commission* (AADAC; 1-866-33AADAC [1-866-332-2322]; www.aadac.com).

Appendix J: Follow-up Survey (Time 1)

1. What are your reactions to the information presented on the previous page? Please use sentences or words (point form) to describe how you feel (e.g., surprised, doubtful, don't care). Try to explain why you feel this way. [BOX]

2. How credible is the information you just read? [Radio buttons]
1 (Not at all credible)
2
3
4
5
6
7 (Very credible)

3. How skeptical are you of the information you just read? [Radio buttons]
1 (Not at all skeptical)
2
3
4
5
6
7 (Very skeptical)

4. How much will this information motivate you to change your drinking habits? [Radio buttons]
1 (I am not at all motivated to change my drinking habits)
2
3
4
5
6
7 (I am very motivated to change my drinking habits)

5. If you wanted to reduce your alcohol consumption, why would you do this?

5a. Because somebody else wanted you to or because the situation demands it. [Radio buttons]
1 (Not at all)
2
3
4
5
6
7 (Completely)

5b. Because you would feel ashamed, guilty, or anxious if you didn't. [Radio buttons]
1 (Not at all)
2
3
4
5
6
7 (Completely)

5c. Because you really believe it's an important goal to have. [Radio buttons]
1 (Not at all)
2
3
4
5
6
7 (Completely)

5d. Because of the fun and enjoyment it provides for you. [Radio buttons]
1 (Not at all)
2
3
4
5
6
7 (Completely)

[Button: Submit]

Appendix K: Electronic Invitation to Complete the Follow-up Assessment

Six weeks ago, you completed a survey on campus alcohol use. You are now invited to complete a follow-up survey. If you complete both surveys, you will have a chance to win one $200 gift certificate.

Remember, participation is voluntary. The information you provide will be held confidential.

Interested? Please go to www.atl.ualberta.ca/alcoholsurvey and enter password at the end of this message.

Your password is:

Appendix L: "Reminder" electronic invitation to complete the follow-up assessment

Seven weeks ago, you completed a survey on campus alcohol use. You are now invited to complete a follow-up survey. If you complete both surveys, you will have a chance to win one $200 gift certificate.

Remember, participation is voluntary. The information you provide will be held confidential.

If you have not already completed the follow-up survey, please go to *www.atl.ualberta.ca/alcoholsurvey* and enter password at the end of this message.

Your password is:

Appendix M: Introductory Page for Follow-up Assessment (Time 2)

Welcome to the follow-up survey for our on-line study of student alcohol use!

Some of the questions on the follow-up survey are similar to those you were asked six weeks ago. However, by answering these questions, you are helping us to determine an accurate picture of alcohol use at the U of A.

The survey will take you about 5 minutes to complete. Please click on the button below to proceed.

[Next]

Appendix N: Follow-up Assessment Instrument (Time 2)

The following questions ask about your drinking patterns in a number of different ways.

For these questions, **one drink is equal to**: 12 oz (341 mL) beer
5 oz (142 mL) wine
1.5 oz (43 mL) spirits

1. Have you had any alcohol in the past month? [Radio buttons]
Yes
No

If you answered "no" to #1, go to the bottom of the page and press *next* .
If you answered "yes" to #1, continue on this page.

2. Think about the past month. Please fill in a rough estimate of the number of drinks you usually consumed on each day of the week.

	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
Number of drinks							

3. In the past month, how many times did you consume **4 or more drinks** on a single occasion?
[Box]

4. In the past month, how many times did you consume **5 or more drinks** on a single occasion?
[Box]

5. In the past month, what is the maximum number of drinks you consumed in a single occasion?

I consumed [Box] drinks in [Box] hours.

[Next]

PART C: CAMPUS NORMS

Remember, **one drink is equal to**: 12 oz (341 mL) beer
5 oz (142 mL) wine
1.5 oz (43 mL) spirits

Think about MALE/FEMALE students attending universities across Alberta, then:

6. Estimate the percentage of MALE/FEMALE students who **do not** use alcohol.
Your guess: [Box] % of students.

7. Estimate the average **number of drinks** consumed in a **week** by MALE/FEMALE students who drink.
Your guess: [Box] drink(s).

8. Estimate the average **number of times in a month** MALE/FEMALE students who drink have **5 or more drinks on a single occasion**.
Your guess: [Box] time(s).

9. Estimate the percentage of MALE/FEMALE students who agree with the statement "*drinking is an important* ***part of the university experience.***"
Your guess: [Box] % of students.

10. Estimate the percentage of MALE/FEMALE students who agree with the statement *"it is important to show how much you can drink and still hold your liquor."*
Your guess: [Box] % of students.

11. Estimate the percentage of MALE/FEMALE students who agree with the statement *"you can't make it socially at this university without drinking."*
Your guess: [Box] % of students.

[Next]

PART D: ALCOHOL-RELATED CONSEQUENCES

Here are a number of events that people sometimes experience. Indicate whether any of these things have happened to you in the past month: [Radio buttons]

12. I have been unhappy because of my drinking.
Yes No

13. Because of my drinking, I have not eaten properly.
Yes No

14. I have failed to do what is expected of me because of my drinking.
Yes No

15. I have felt guilty or ashamed because of my drinking.
Yes No

16. I have taken foolish risks when I have been drinking.
Yes No

17. When drinking, I have done impulsive things that I regretted later.
Yes No

18. My physical health has been harmed by my drinking.
Yes No

19. I have had money problems because of my drinking.
Yes No

20. My physical appearance has been harmed by my drinking.
Yes No

21. My family has been hurt by my drinking.
Yes No

22. A friendship or close relationship has been damaged by my drinking.
Yes No

23. My drinking has gotten in the way of my growth as a person.
Yes No

24. My drinking has damaged my social life, popularity, or reputation.
Yes No

25. I have spent too much or lost a lot of money because of my drinking.
Yes No

26. I have had an accident while drinking or intoxicated.
Yes No

[Next]

27. Do you remember reading information on this website about how much and how often Canadian university students drink alcohol?

28. Do you remember reading information on this website about Canadian university students' beliefs about the role of alcohol in campus life?

[Button: Submit]

Appendix O: Follow-up Study Completion Message

Thank you for completing this survey!

If you have questions or concerns related to alcohol use, you may contact the University Peer Health Educators on campus (492-2612; www.ualberta.ca/HEALTHINFO/peered.htm). You may also contact the Alberta Alcohol and Drug Abuse Commission (AADAC; 1-866-33AADAC [1-866-332-2322]; www.aadac.com).